

JOHN LANSDALE, JR.

MILITARY SERVICE

To Mike Scott

My Best regards

John Landee Jr

G - Michael Scott - ASA Counsel - 6.18.03

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JOHN LANSDALE, JR. -- MILITARY SERVICE

Upon graduation from the Virginia Military Institute in 1933, I received a commission in the United States Army Reserve as a Second Lieutenant, with assignment to the field artillery. In each of the summers of 1934 and 1935 I spent two weeks on active duty. In 1934 at Fort Sam Houston, Texas with the 344th Field Artillery, and 1935 with the 56th Cavalry Brigade, Texas National Guard, at Mineral Wells, Texas. In 1937 I was promoted in the Reserve to First Lieutenant. I graduated from the Harvard Law School in 1936. Before graduation I had accepted employment by the firm of Squire, Sanders and Dempsey, Cleveland, Ohio. On June 17, 1936 Metta Virginia Tomlinson and I were married and during the next two years our daughters Helen and Chloe were born. The demands of a beginning law practice and a young family combined to divert me from continuing activities in the army reserve. However, events soon reminded me of my military obligations. The increase in tensions throughout the world consequent upon Japan's military adventures and the renaissance of Germany resulted in steps being taken by the United States to beef up its military organization which had been permitted to decline to a very low level. This took the form in part of offering active duty to reserve officers but not compelling such duty and I declined the offers. However, in 1939 Hitler

initiated World War II by the German invasion of Poland and the United States began active support of the British and French war effort. At the same time the Japanese stepped up their aggressions in the Far East. It soon became apparent that unless some dramatic reversal of events took place the United States would be drawn into the conflict. As a consequence, the calls on reserve officers to accept active duty became more and more insistent. On two occasions in 1940, I was advised by the Ohio Military District that I would be called to active duty. By this time we had a large mortgage in addition to two small children and I successfully begged off of active duty. By early 1941, however, it became evident that military service was inevitable and I would be better off to get into it sooner rather than later. After discussion with Metta, I decided that it would be wise, the next time I was importuned, to accept active duty.

This was a reluctant decision because I enjoyed my work at Squire, Sanders and Dempsey. For some time I had been engaged, full time, in defending the Cleveland Railway Company in personal injury suits in Cleveland Municipal Court. I was in sole charge of that docket which put me in court virtually every day. However, most recently, I had worked with Clan Crawford and Ralph Besse in preparation for litigation with the City of Cleveland over rates of the Cleveland Electric Illuminating Company. There had not been any proceedings in Ohio over electric rates since

the establishment of the predecessor of the Public Utilities Commission in 1911. I did the basic research on the requirements of the Ohio public utility statutes. That case was settled but my work there had a major influence on my post war career.

I expected to be called to active duty early in 1941 and sent to Fort Sill, Oklahoma as an instructor for the field artillery which trained at that location. This was the fate of several of my classmates commissioned in the field artillery who had previously gone on active duty.

However, on or about May 18, 1941, I received a letter dated May 16 from my V.M.I. classmate, Frank McCarthy, who suggested I request a call to active duty to serve in Washington in the Military Intelligence Division of War Department General Staff. Frank, at that time was on active duty there and one of his duties was the recruitment of additional personnel for the rapidly expanding activities of that Division. I acted on his advice and shortly thereafter (on May 27, 1941) I received orders to report on June 10, 1941 for active duty as a First Lieutenant in the Office of the Assistant Chief of Staff, G-2, War Department General Staff. I was initially assigned to the Investigation Branch, Counter-Intelligence Group.

Metta and I rented the house we had recently bought in Shaker Heights, Ohio, a suburb of Cleveland, and with Helen and Chloe, who were 4 and nearly 3, respectively, moved to the Washington area. Initially we stayed in the country in Anne Arundel County with our cousin, Mary Estep, But shortly moved to a rented house in College Park, Maryland. Thereafter, we moved to a rented house at 1700 Lowell Street in Arlington and thence to Delafield Street, N.W. off of 16th in the District and, finally, towards the end of the war having sold our house in Shaker Heights, Ohio, we bought a house at 30 Williams Lane in Chevy Chase, Maryland. In the meantime, Mary was born at Walter Reed Hospital. This was a very difficult time for Metta on whose shoulders fell the entire responsibility for raising our young children as well as running the household. What a wonderful job she did. She got almost no help from me but never complained.

The Counter-Intelligence Group was concerned with security of information within the military establishment in the continental United States. As the army was organized in the United States this was a staff activity. The country was divided into Service Commands with some variation (e.g., on the West Coast the entity was called the "Western Defense Command") each of which had a staff organization similar to the War Department General Staff. The Assistant Chief of Staff, G-2, Service Command, had a Counter-Intelligence organization which was responsible for

security of information within the service command area at army installations and army defense contractors. Investigators, known as Counter-Intelligence Corps agents, were assigned to the various Service Commands and the Western Defense Command. Normally, no actual investigative activity was conducted by Counter-Intelligence personnel of the War Department General Staff except for liaison with other government agencies such as the Federal Bureau of Investigation. Copies of all reports of investigation made by Service Command or Western Defense Command personnel were sent to the War Department, reviewed in the Counter-Intelligence Group, and filed there. However, Washington normally exercised no command control. Policy, however, was established by Washington which also operated an agents' training school. Graduates of this training school became members of the Counter-Intelligence Corps. This was a very successful operation. The school was good and the Counter-Intelligence Corps on the whole attracted able people.

When I went on active duty the investigative organization, though embryonic, was, for this prewar time, in fairly good shape both as to personnel and administrative policy. I was set to work reviewing reports of investigation. My duty was to see whether the investigations had touched all the bases required by the War Department's prescribed form for investigative reports. Included in the form was a place for conclusions and recommenda-

tions. To one experienced in evaluating evidence, the conclusions appearing in many of the reports were appalling. It is difficult to believe the extreme conclusions as to the disloyalty of individuals which were drawn on the basis of rumor or the political predilection of the G-2 staff officer in charge. Moreover, I saw no evidence that any thought was being given as to what, if anything, to do about persons reasonably suspected of being security risks. Since this was all a staff activity, action responsibility with respect to any specific problem disclosed by an investigation should have been in the Commanding General of the Service Command involved. However, neither army regulation nor standard military thinking was geared to situations not amenable, as these were not, to court-martial or ordinary command discipline. Moreover, dealing with employees of contractors with the military seemed to be difficult for the Service Commands.

I raised questions about these matters and suffered the usual fate of those who do, I was placed in charge of trying to make sure that the conclusions which went into an investigation report were justified by the information upon which they were based and in recommending what, if anything, to do about it. I became first, Executive Officer of the Investigations Branch. Then the review and action activity was placed in a separate branch called the Review Branch of which I became the first Chief. Later on,

and until I was transferred to the Corps of Engineers in order to enable me to devote my full time to the atomic bomb project (in early January 1944) both the Investigation and Review Branches were under my command.

My activities in connection with the security and intelligence problems relative to the atomic bomb project are those which have attracted attention because of the spectacular nature of the project and the novelty of the problems presented. My other services, while not of general interest, seemed to me of some importance, at least at the time, and I believe I made some contributions there.

One problem, the most difficult of all and never satisfactorily solved, was to keep the military establishment from drawing unreasonable conclusions from insufficient facts. This problem was exacerbated by the fact that from the beginning, Russia was regarded, from an intelligence standpoint, as an enemy. For example, often the lead to uncovering persons of communist sympathies was the exhibition of extremely liberal political views or membership in communist front organizations. We regarded persons with membership in the communist party, or clearly in sympathy with it as security risks. This was a sound position because it was perfectly clear that the members of the Communist Party, U.S.A. were loyal to Russia rather than the

United States and the party was, in effect, a branch of the Russian intelligence organization.¹ It was difficult to make people understand, however, that membership in communist front organizations or extremely liberal political views were not of themselves evidence of membership in the communist party or sympathy with the communist cause but rather, at most, factors indicating a need for further investigation. (At the other extreme, however, the political temper of many of those surrounding President Roosevelt were such that a move against a genuine communist sympathizer often drew down upon our heads the wrath of important people.) Membership in Bund Organizations and strong isolationist views were frequently a lead to persons of Nazi sympathies but not alone significant. Yet there were those who thought it enough and still more with insufficient courage to overrule unwarranted conclusions made and recorded by investigating agents.

For example, we had an investigation report on a Major from Cincinnati of German extraction. He had belonged to a Bund in Cincinnati and the investigating agent had concluded without

1/ For example, we recorded a conversation between one Steve Nelson, Secretary of the Communist Party on the west coast and Joseph Weinberg, a young scientist then employed on the atomic bomb project in which Nelson said he was looking for a comrade who was "absolutely trustworthy" to which Weinberg replied that he was and that he was willing to cooperate with the Party in passing information to Russia because he believed in it and that it was right and he proceeded to pass along information about the project.

adequate cause, in my opinion, that he had Nazi sympathies. It so happened that he was a quartermaster in one of the units under General Patton's command then staging on the East Coast for the invasion of North Africa. The half-baked report went to General Patton before we had an opportunity to see it. General Patton gave the major sealed orders to take to the captain of one of the transports lying in port at Norfolk. The orders required the captain to place the unfortunate major under arrest, lock him in the brig and keep him there while the ship traveled to North Africa and back. I heard about this proposal from the intelligence officer who had been unwilling to accept responsibility for overruling the conclusion of the investigating agent and had passed the report on to General Patton. I went to see General Patton, who was then in Washington, to try to persuade him that he was needlessly ruining the reputation and future of a capable officer wholly innocent of the charges against him. I might as well have talked to a profane post. I was unable to get this "command" decision overruled and General Patton actually carried out this childish plan. I do not know what eventually became of the hapless major.

We had similar problems of the opposite kind. We refused to permit the commissioning of officer candidates who we believed to be communists. For this we were harrassed by the vociferous left including Mrs. Roosevelt. With respect to a small group the

pressure became so great that the Deputy Chief of Staff appointed a special commission of general officers to review their cases. My actions were upheld. However, many of them were commissioned anyway by direct orders from the White House.²

Aside from these distracting harassments, the problem of handling genuine subversives was a very real one. It was my function to make recommendations to the Assistant Chief of Staff G-2 in this regard. Reserve officers we could discharge out of hand by authority of the Chief of Staff and this we did (fortunately we had no problem with any officer of the regular army establishment). Officer candidates we could refuse to commission. This we did though, as noted above, it did not stick in every case. Enlisted men (and those refused commissions or deprived of them for the most part became enlisted men) were a different problem. We could have discharged them but somehow to relieve them of military service seemed a reward for potential subversion. We could not court-martial them except for actual subversion and in any event this was, for security reasons an undesirable course of action. Unlike an officer there were many jobs we could give them where they would not be dangerous. I therefore proposed, and persuaded the War Department to form, a

^{2/} This matter was alluded to by Representative Curtis of Nebraska in a speech in the House of Representatives on August 31, 1944. See, Congressional Record, August 31, 1944, Vol. 90 No. 140, page 7565.

special organization -- the technical designation of which escapes me now -- to which we transferred these men. One company was for communist sympathizers and one for Nazi adherents. I find some correspondence in my file with a Captain William L. Toston who was commanding officer of at least one of these companies, then stationed at Camp Carson, Colorado, which indicates that it was known as the 358th, although 358th what, I cannot now remember. Eventually the organization to which we assigned the communist sympathizers was sent to fight the Germans and the organization of alleged Nazi sympathizers was sent to fight the Japanese. I was told that each organization acquitted itself with distinction.

One of my jobs was to serve on the Japanese-American Joint Board responsible for releasing Americans of Japanese extraction on an individual basis from the concentration camps in which they had been confined during the period of hysteria immediately after the Pearl Harbor attack. I was the G-2 representative on this Board, the Chairman of which was Mr. McCloy, Assistant Secretary of War. The orders releasing these people were issued by my office over my signature. One of my officers who had some political background (W. A. Consodine) told me that in view of the reputation I must have acquired among Japanese-Americans he would like to run me for office in California after the war. In due course, I received a commendation for my work on this Board.

I often thought it ironic that the officer in charge of rounding up and incarcerating these unfortunate people received a DSM for his work whereas those of us who undertook the infinitely more difficult job of getting them out received, at most, faint praise.

I had the foregoing responsibilities until January 7, 1944. In the meantime as a separate matter I was quite busy with matters concerning the atomic bomb project. In February, 1942 shortly after my promotion to Captain, I was directed by General Lee then the A. C. of S., G-2, to report to Dr. James B. Conant to assist him in a matter which he would describe to me. Dr. Conant, the president of Harvard University was Chairman of the National Defense Research Committee which was a part of the Office of Scientific Research and Development. These organizations were devoted to enlisting members of the American scientific community in support of the war. I promptly called on Dr. Conant who had an office on Massachusetts Avenue. He advised me that in the light of recent scientific discoveries it appeared likely that it would be possible to develop an atomic bomb with very devastating explosive potential. He advised me that it was known from the reports of German refugee scientists that the Germans were working on the possibility of developing such a bomb and that, indeed, the first experiment which definitely opened up the possibility of tapping the energy of the atom had been

performed and its results published by two German scientists, Otto Hahn and Lise Meittner. He told me that work was going forward in laboratories at several locations in the United States under the supervision of his committee with a major part of the effort occurring in the Radiation Laboratory at the University of California in Berkeley. He advised me that the principal scientists on the project were convinced that if the Germans found out that the Americans were actually working on producing an atomic bomb they would redouble their efforts and, being already ahead of us, would surely get it first. He said they were convinced that the country which first obtained a workable atomic bomb would win the war. Therefore, the responsible scientists working on this project believed that security was very important but they were fearful that it was not being adequately observed, particularly at the University of California at Berkeley. He said he was turning to the War Department for help in this respect and what did I suggest. I told him that as a first step the best thing was for me to put on my civilian clothes and go out to the University of California and find out what was going on. He told me he had assumed that this is what I would wish to do and he had obtained from Mr. Sproul, the President of the University of California, a card giving me temporary membership in the faculty club which, he advised me, was the center of life at the University. In addition he handed me a copy of an article published in the September 5, 1941 issue

of Science (Vol. 94 at page 221) by Professor Ernest O. Lawrence head of the Radiation Laboratory at the University of California entitled: "The New Frontiers in the Atom". This was an address delivered at the 50th Anniversary celebration of Stanford University on June 16, 1941. This article lays out quite clearly the possibilities and the problems involved. A copy is attached, marked Appendix A. It was my introduction to the fact, later confirmed many times, that the really able people in any field write so that intelligent persons without special background can understand what they are talking about at least when they write about fundamental concepts.

I left for California in the middle of February and returned about the first week of March, 1942. I kept a handwritten diary which I still have. This breaks off in mid-sentence of an entry dated March 3. I have no idea where the balance is but it could not have been very much.

I went out to San Francisco on the train which required me to change trains in Chicago. The train to San Francisco departed Chicago late in the afternoon. After boarding the train, I went to the club car to have a drink. I sat down in a chair next to a man who turned out to be Charles Hogan, a professor at the University of California, Berkeley, and an official with the U.S.O. (United Service Organization) which provided assistance to

enlisted men in airports and railroad stations. This seemed as good a time as any to try out my cover story which I did not think was especially clever but was the best I could think of. I told Mr. Hogan that I was a lawyer in Cleveland who had been born in the San Francisco Bay area and that I had made up my mind that all of us had to pitch in and do our part in the war against the evils of Nazism and I intended to volunteer for that purpose. I told him, however, that I wanted to return to my roots in Northern California and combine that with some research that I felt a need to accomplish before going into the military service. He thought this was just great. I told him that I had an introduction to the president of the University and I wanted to get an introduction to the faculty club. He said the president would not do me any good but that I should see Max Radin who would be very sympathetic with what I planned to do.³ Mr. Hogan gave me letters to Professor Radin and a Professor Edward V. Bremer of the Department of German. His letter to Mr. Radin read as follows (Dated February 18, 1942):

"Dear Max:

3/ Max Radin was the dean of the law school of the University of California and was politically very radical. The California legislature had refused for the latter reason to confirm his appointment to the California Supreme Court. There had also been a fair amount of publicity as to protests against Radin receiving appointment as dean because of his radical activities.

On my way West I've met a lawyer who shows signs of sense; maybe you'd like to meet him. John Lansdale is spending two weeks in Berkeley before going to the government. That's wisdom. He has a letter to Bob Sproul but I advised him to tear it up and present this to you.

I spent some pleasant hours with Rhea in Washington. She prospers.

I hope we can get together soon.

Best to you,

Hugo"

Upon my arrival in San Francisco the next day (February 19) I went out to the University and found Dr. Sproul out of town but saw his secretary, a Miss Robb, who handed me a guest card to the faculty club. She introduced me to a Mr. Blaisdell who ran "International House" on the campus where I secured a room.

I promptly visited Max Radin at the law school and presented Charles Hogan's letter to him. He received me cordially.

The next morning, February 20, I walked up a hill on the campus where a new cyclotron, an important research tool for the Radiation Laboratory, was under construction. In so doing, I went through two open gates upon each of which there was a sign which said "Blind Road -- No Visitors." I spent about two hours up there looking around, talking with workmen and examining the construction which is described in length in my diary. On a bench near the magnet area were numerous blueprints covering various phases of the "one-hundred eighty-four inch cyclotron" I engaged in a rather long conversation with Mr. Miller the superintendent of construction who described his job to me at some length. He told me that they were way behind schedule because of difficulty in getting materials, but that they now had a "priority" and could get anything they wanted because the cyclotron was to be used in defense work: "They are trying to break the uranium atom which every country in the world is trying to do." I indicated to him that I remembered reading about that last fall as a source of power. He told me that it was not so much the power they were after as a "new explosive."

Pursuant to an invitation extended on the previous day, I had lunch with Max Radin at the faculty club. After lunch we sat out on a veranda and while we were there Dr. Lawrence, with a crowd from the Radiation Laboratory came in. He was identified to me by Mr. Radin who said that he and Lawrence were old friends. I

related to Max Radin my experiences of the morning. Mr. Radin said that Lawrence is "under contract" to the government and that "it is the explosive theory that he is working on." According to Radin he frequently visited Washington on that account. Radin said that he knew what they were doing. He said, "The theory of gun powder is the sudden expansion of hydrogen from the solid to the gaseous state. Think how infinitely greater an explosion from the sudden expansion of the atom."

That afternoon, I returned again to the cyclotron construction site and demonstrated to my own satisfaction that I could have purloined the blue prints for the structure very easily.

I eventually called on Professor Brewer, the other person to whom I had an introduction from Hogan, and he invited me to lunch at the faculty club. He knows nothing about the work in the radiation laboratory on the cyclotron. He was, however, a good friend of a Mr. Cooksey who was in charge of the administration of the Radiation Laboratory. I had told him I wanted to meet someone who could give me some literature about the cyclotron. He suggested Cooksey who was then eating at another table. We were not able to see him then; however, he invited me to his house for cocktails at 4:30 p.m. the next day. In the meantime, he suggested I approach Cooksey telling the latter that Ned Brewer told me too. I did that before dinner that same day. He

referred me to the Lawrence Stanford speech [the paper handed to me by Dr. Conant before I took this trip] and told me to see a Miss Griggs at Mr. Lawrence's office for a reprint of it. I suggested the possibility of use of the cyclotron in the war as a reason for my interest, referring to my talk with Miller. He said that any connection between the experiments with the cyclotron and the war was very far fetched. He said, however, that they did have high hopes for it in connection with the treatment of cancer. Mr. Cooksey was the only one I met who had any reticence at all.

Brewer had pointed out to me a large table for ten in the small dining room at the faculty club as the "physicists table" where he said the research people, known as the "Lawrence's Brain Trust, had lunch. It was, he said, a changing group frequently having lots of foreign appearing persons in it.

On the 25th of February I sat at a lunch table with a young man I had seen at the "physicists table" and was eating alone. He told me he had been there only a couple of months and is in the chemistry department. The conversation got around to the cyclotron and he was surprised I got in there since it was to be used for defense work. He told me that they were working on the separation of the isotopes of uranium known as uranium 235, the difficulty being that the chemical properties of the various

isotopes are identical so that the only difference is a slight difference in atomic weight and that the slight difference in atomic weight is further muddled by the fact that the work has to be done with uranium in combination with other elements.

On February 28 at the faculty club I engaged in conversation with a man about my own age [J. P. Kennedy] whom I had seen in Professor Lawrence's office and who ate at the physicists table. He was working on the separation of isotopes. He told me that they were sure that the new cyclotron will be the biggest in the world though the Russians were reputed to be building a large one. They think that the Germans have only a small one but they are said to have moved all the ores found in occupied countries to Germany. He told me, however, that uranium is plentiful enough so that if a practical means of separating the isotopes could be found enough of U-235 would be available though it occurs only one part in 139 parts. He told me that the cyclotron is a dud as a manufacturing machine. The most of any isotope ever obtained on a cyclotron is one microdot. The cyclotron is an investigating machine. It enables them to find out more about the structure of the atom and how to release the energy in uranium. He told me that the difference between the two isotopes of uranium is more than one of mere weight. The cohesion of the atom seems to depend greatly on whether the nucleus contains an odd or an even number of particles. He told me that all the

other countries were working on a separation of uranium isotopes so we had to also. He told me that one pound of U-235 contained enough energy to lift all the buildings in San Francisco a half a mile high if the energy on fission could be suddenly released and that it was plain the discovery of such would win the war but he said that there was not much hope of finding a practical means of separation of the isotopes.

During my last two or three days at Berkeley I was pretty aggressive about mixing with the physicists and finding out what they were doing.

I returned to Washington in early March and went immediately to see Dr. Conant. I reported to him substantially what I had done and read to him excerpts from my diary which, of course, demonstrated that there was not much security at Berkeley. He was greatly disturbed and asked for my suggestions. I suggested that I go back out to California in uniform and give a talk on security to the group of workers at the Radiation Laboratory. He agreed and I made a pretty dramatic appearance before the group many of whom recognized me as being the person that had been around the faculty club and University for a couple of weeks. I read to them excerpts from my diary and in general tried to impress upon them how careless they were and how important it was to avoid telling strangers what they were doing. Professor

Cooksey told me that he had become suspicious of my activities and was contemplating reporting me to the FBI about the time I left Berkeley.

On May 15, 1942, I called on Dr. Arthur Compton, who headed the laboratory working on the project at the University of Chicago (the Metallurgical Laboratory) and discussed with him the need for better security. Most of the work then being done was either at Berkeley or the University of Chicago.

I had no further contact with this project until the latter part of September 1942 when I was called upon in my office which, by that time, was in the newly constructed Pentagon, by then Brigadier General, L. R. Groves. He advised me that the atomic bomb project had recently been transferred to the responsibility of the army and that he had been placed in charge of it (on or about September 17, 1942). He said that, with the consent of General Strong, then A.C. of S., G-2, W.D.G.S., he asked me to take responsibility for the security of the project. He explained that he came to me because of my prior contact with the project and his desire to limit the knowledge to as few persons as possible. He wished to utilize the existing army organization to the fullest extent possible so that he could keep his own organization small and yet at the same time avoid dissemination of knowledge of the project through the regular establishment.

I organized to do this work in the following way: One of my officers in G-2, H. K. Calvert, was transferred to the Manhattan Engineer District (the administrative organization for the project) to be responsible for staff work on security throughout the project. As a substantive matter, however, he was to continue to report to me. He built up a small organization to make and enforce security policy. The investigative organization and the mechanism for dealing in security matters with other agencies of the government (for example, the FBI) was built up under my command in G-2 War Department General Staff. With the approval and the full support of General Strong, I built up in my own office and in the office of the G-2 of each Service Command, and the Western Defense Command, a separate organization for this purpose which operated entirely outside regular military channels. We maintained separate records and a chain of command from a selected officer in each Service Command and the Western Defense Command to me in Washington and from me to General Groves. Armed with a letter from General Strong to each G-2 on the staff of the commanding general of the various Service Commands and the Western Defense Command, I visited each of these commands and selected a responsible officer to whom I outlined my proposed organization.

Within a comparatively short time we had several hundred officers and agents in this nameless adjunct to the Military

Intelligence Service. It is a tribute to the tact and intelligence of the men in the Service Commands that this organization was able to operate efficiently and without undue attention despite the fact that it operated independently of the commanding generals to whom the people involved nominally reported.

These organizations in the Service Commands and in the Western Defense Command did all the investigative work involved in clearing people for access to secret information. It also dealt with some very complicated and important espionage attempts on the project and engaged in a number of novel and interesting activities to ensure the security of the project. We handled in Washington any necessary liason with other governmental agencies. For example, we secured the cooperation of the Office of Censorship. At that time, that office was run by Nat Howard, a Clevelander who was Editor of the old Cleveland News and later by Jack Lockhart an important official of the Scripps-Howard organization which owned the Cleveland Press -- then the dominant Cleveland newspaper. My peace time connection with the Cleveland law firm of Squire, Sanders & Dempsey was very helpful in securing the cooperation and assistance of these men.

We procured the designation of the air space over and in the vicinity of the three substantial reservations which became part

of the project (Oak Ridge, Tennessee, Hanford, Washington, and Sante Fe, New Mexico) as "restricted" which had the effect of forbidding flight over the projects. At one time during a foggy night an aircraft was heard over Hanford. I discussed the problem of what, if anything to do with my V.M.I. "brother rate", Colonel Frank McCarthy (by that time, Secretary, General Staff). Since we could find no evidence of either a military or civilian aircraft aloft and unaccounted for we alerted a pursuit squadron of the Western Defense command because we had reports of Japanese submarines operating off the West Coast. Eventually, and fortunately, we did nothing more. The problem turned out to be a civilian craft lost in the fog which had taken off without filing a flight plan.

Sometime during 1943 the antitrust division of the Department of Justice began an investigation of the DuPont Company, one of the major contractors on the project in connection with activities related to the project. I called upon Tom Clark then Assistant Attorney General in charge of antitrust and secured his cooperation in dropping the investigation. (Mr. Clark later became Attorney General and thereafter a Justice of the Supreme Court of the United States.)

General Groves discovered that the president had been sending copies of highly secret reports on the atomic project to Mr.

Justice Frankfurter of the Supreme Court with whom I had some slight acquaintance while I was at Harvard Law School. I called upon Justice Frankfurter to impress upon him the need for secrecy and to obtain from him the return of all copies of these reports. I found the Justice to be very understanding and helpful.

In his book, Day One, published in 1984, Peter Wyden says (page 119) that Justice Frankfurter learned of the atomic bomb project from Niels Bohr, the famous Danish Nuclear physics pioneer, and had, at Bohr's request, talked to the President about problems of international control and the desirability to that end of informing the Russians about the project. According to Wyden, Bohr talked to Roosevelt and later Churchill about this. Churchill is said to have effectively killed the idea. See Wyden, pg. 119-128.

I knew nothing of this background at the time I saw Justice Frankfurter. He did not mention it but handed over the reports he had without further ado. Incidentally, following the death of President Roosevelt his executors took the position that all papers in the White House of whatsoever nature were the private property of his estate. However, reports about the project to the President were found under seal and were stored in the Archives so sealed. I was advised that General Marshall requested President Truman to retrieve them. I assume he did so.

A copy of my report to General Groves about this matter is attached as Appendix B. The Baker mentioned in paragraph 3 is Neils Bohr.

One important activity of my Washington office was liaison with the Federal Bureau of Investigation. Under general agreements made at the outset of the war among various agencies, security matters in the Army or the Navy itself, and contractors under the supervision of one of the services, were handled by the Army or the Navy as the case might be. Security with respect to all other activities was the responsibility of the FBI. Thus, prior to September 17, 1942, when the army assumed responsibility for the project, responsibility for subversive activities with respect to the atomic bomb project was nominally in the FBI. However, nobody had bothered to alert the FBI about the project. Subsequent to that time, it was the responsibility of the army in general, and of my office in particular.

One of my early activities was to make contact with the FBI and establish a specific channel of communication. By that time I was having regular contact with the FBI in connection with my regular activities because we always checked with the FBI for any information in their files concerning persons under investigation and we exchanged information on alleged subversive activity. However, for this project I thought it was important that we have

a specific channel. The channel established was between me and a Mr. Tamm, Mr. Hoover's personal assistant, and a very able FBI agent named Lish Whitson who was head of what the FBI referred to as its "Communist Desk." Whitson was very cooperative and a gold mine of information.

The responsible officer in the Western Defense Command was Lieutenant Colonel Boris Pash, head of Counter-Intelligence on the staff of G-2. Col. Pash was of Russian ancestry - the son of the head of the Russian Orthodox church at the time of the Russian revolution and a bitter opponent of Communism. He was a man of considerable ability and well fitted for the job. Because of my earlier investigation of the situation at the Radiation Laboratory at Berkeley we gave close attention to that portion of the project from the beginning. Moreover in connection with his regular security duties for G-2 Western Defense Command, Colonel Pash was knowledgeable concerning the very active communist party organization there. I discovered early on that the San Francisco-Berkeley area was a hot bed of communist activity. This was actively stimulated by the very large Russian Consulate in San Francisco and by a man named Steve Nelson, the General Secretary of the Communist Party on the West Coast. There was a very active Communist Party membership among young scientists and technicians working in the many scientifically oriented establishments in the San Francisco Bay area. Many of them were

active members of a labor organization known as the Federation of Architects, Engineers, Chemists and Technicians (FAECT) which was making efforts to organize the Radiation Laboratory at the University of California at Berkeley.

It soon became evident that the Russians were making very active efforts to get information about what was going on at the Radiation Laboratory. By early 1943 Colonel Pash, was conducting a wide spread and complex investigation of communist activity respecting the Radiation Laboratory and doing so very ably indeed. A number of very intense investigations of the activities of several Communist Party members who were on the project were conducted by Pash. These people were followed and clandestine microphones were installed in their houses and in places they frequented. The technique employed was to install a new cord on the telephone receiver with one more wire than ordinarily required. This wire bypassed the disconnect on the telephone enabling the telephone to be used as a microphone. This enabled us to monitor both telephone calls and conversations in the vicinity of the telephone. At one point Pash with the assistance of the local telephone company had a switchboard installed in the basement of a rented house in Oakland manned 24 hours a day where a number of these clandestine microphone installations were monitored and recorded. Somewhere in the files is the transcript of one recording of Steve Nelson counting

out money being paid over to one of the young scientists having a minor connection with the Radiation Laboratory in Berkeley. We recorded a conversation between Steve Nelson and one Joseph Weinberg - a brilliant young physicist in which Nelson recruited Weinberg to report on the work at the Radiation Laboratory. Weinberg said he would do this because he was a member of the Communist Party and "believed in it." These cases illustrate the problems we had in the enforcement of security. Here were clear cases of criminal acts for which the guilty individuals could and should have been sent to jail. However, there was no way in which this could be done without giving away more secrets than we could possibly preserve by any such prosecution and we regarded the preservation of the secrecy of as much of the project as we could as more important than the punishment of the guilty. In this particular case, and others, we arranged to have the individuals involved inducted into the army and sent to isolated duty locations.

Incidentally it is interesting how we identified certain of the men whose incriminating conversations with Steve Nelson were recorded. Agents who had the Nelson residence under surveillance picked up the men as they left the house. As the two walked down the street they joined two others and a sidewalk photographer took their picture and tried to sell them the picture. They refused to buy. However, the agents following them bought the

picture from the sidewalk photographer on the basis of which they were soon identified. They were communists all and all on the project. They were soon off the project and at least three were inducted into the army.

The most serious and difficult clearance problem which I encountered on the project was that involving Dr. J. Robert Oppenheimer.

In June 1942, before the army took over responsibility for the project, Dr. Oppenheimer was appointed as the head of a small group to investigate the mechanisms for actually constructing and detonating an atomic bomb assuming the other difficulties could be overcome. Fairly soon after the army took over the project it became evident that this activity had to be expanded and General Groves was confronted with the question whether Dr. Oppenheimer should continue in this job or be replaced by someone else. At or about the same time in the course of our checking out the principal scientists on the project, we received rather extensive reports from the FBI concerning Dr. Oppenheimer and his family and through Colonel Pash, we initiated our own investigation. This did not present a very reassuring picture. In summary, the information we then developed and my conclusions, were as follows. Oppenheimer was probably not a member of the Communist Party, however, he was quite close to a number of people who

were, and he had unquestionably made important financial contributions to the Communist Party. (Dr. Oppenheimer had substantial independent means) Mrs. Kathryn Oppenheimer (or Kitty as she was known) was the widow of one Dallet the Political Commissar of the Abraham Lincoln Brigade⁴

Mrs. Oppenheimer probably had been a member of the Communist Party and her first husband (Dallet) was certainly a member. (Steve Nelson (in a conversation with Joseph Weinberg clandestinely recorded said Dallet was his "best friend"). Oppenheimer's brother, Frank, had a wife, Jackie, who was an active member of the Communist Party in the Berkeley area and Frank may have been. Steve Nelson, in the conversation referred to above said that Oppenheimer was at one time very sympathetic to the Party but that he had greatly changed, as had his wife.

Thus, there was plenty of "smoke" and some amount of "fire". Ordinarily we would have not pursued the matter any further, but would have refused clearance to a person with Oppenheimer's record and associations. But this was no ordinary situation. The activity for which Dr. Oppenheimer was responsible was, of

^{4/} The Abraham Lincoln Brigade was an organization of communists recruited in the United States to fight in the Spanish Civil War which was in essence a contest between leftist forces on the one hand and conservative forces headed by General Franco on the other. The leftist forces were supported by arms and advisors furnished by the Russians and Franco was largely supported by arms and advisors furnished by the Germans.

course, the very core of the project as well as being one of the most, if not the most, difficult of the problems confronting the project. General Groves in his book "Now It Can Be Told," outlines to some extent his endeavor to find someone other than Oppenheimer who could take charge of the construction of the bomb. I have recently reviewed General Groves' account of his consideration as to whether Oppenheimer should be continued on the project. His account seems rather mild compared to what I remember. My recollection is of a rather aggressive search for someone else who had the combination of qualities necessary for this job, and General Groves and I had several serious and lengthy conversations about the problem of Oppenheimer's clearance. The FBI reports which we had were further supplemented by Colonel Pash's very capable investigations and we received from Colonel Pash a very strong recommendation against the clearance of Dr. Oppenheimer. In addition, the FBI bombarded us with reports suggesting subversive activity by Dr. Oppenheimer.

[This is as good a point as any to indicate the method used by the FBI to influence the decisions of executive agencies. The FBI made a fetish of making no recommendations. It took the position that it was simply an investigative organization and that what to do about facts which it developed was the exclusive prerogative of the executive agency involved. The typical FBI

report consisted of a cover sheet with a poorly done summary, accompanied by copies of the unedited reports of FBI field agents. These reports were a mixture of speculation, hearsay and solid information but no attempt was made to analyze or comment on any of these reports. I thought then and I still think that it was an outrage the way the FBI dumped these unedited and unanalyzed reports on various executive agencies without making any attempt to sift fact from fancy. At the same time if Mr. Hoover or his people disapproved of the failure of an agency to take some action on the basis of one of these reports he had a way of sending copies of the reports to the next higher echelon in government, as high in some cases as the White House, labelled "for your information." Although the FBI had some very good people and did some good work, (Lish Whitson, previously mentioned, was a good example) I personally formed a very low opinion of its ability as an organization and a feeling bordering on contempt for the way it discharged (or failed to discharge) its responsibility to the agencies charged with substantive handling of activities where security was important. We had several situations where the FBI participated with us or handled for us surveillances of suspected individuals. They seldom did a good job.]

It soon became evident that Dr. Oppenheimer was absolutely essential to the project. I remember asking General Groves in

the course of one of our long conversations about it what he would do if we were convinced that Oppenheimer was a spy. His response was that he would "blow the project wide open." Eventually, I conducted a long interview with Oppenheimer which was recorded, a copy of which must be somewhere in the files (It was used during the Oppenheimer hearings but I have not been able to find it at Archives), and I also had several long conversations with Kitty Oppenheimer. In the end, I convinced myself that whatever Oppenheimer's background, or more precisely the background of his wife and relatives, and whatever might be his political leanings, he was completely loyal to the United States. Moreover, it was perfectly evident that both he and his wife regarded this project as his outstanding career opportunity. I became convinced that not only was he loyal, but that he would let nothing interfere with the successful accomplishment of his task and thus his place in scientific history. I so recommended to General Groves and he directed the District Engineer to issue a clearance for his employment. Subsequently we kept very good track of Dr. Oppenheimer and I believe we fully covered all of his activities. We never had any reason to regret the decision. When General Groves decided to clear Oppenheimer he determined to have a plain conversation with him first. As a matter of interest I attach my memorandum to the General, dated 6 July, 1943, preceding this meeting. Appendix C. I attach also the General's directive to clear Oppenheimer, dated 20 July, 1943. Appendix D.

In March 1943 Colonel Pash's organization recorded the conversation between Steve Nelson and a young scientist on the project named Joseph Weinberg, referred to above, at a meeting in Steve Nelson's house in which Weinberg agreed to supply information to Steve Nelson for transmission to the Soviet Union and gave Steve Nelson a description of the project as Joseph Weinberg saw it. In the course of that conversation, they discussed Oppenheimer and his wife at some length. The substance of this conversation is to the effect that Kitty Oppenheimer had at one time and for a short period been a member of the Communist Party and was married to Steve Nelson's best friend (Dallet) who was killed in Spain in the civil war there. This conversation indicates that although Oppenheimer had been very sympathetic to the Communist Party, he had never been a member of the party but the two of them were very unhappy because he has "changed quite a bit." Joseph Weinberg said, "You won't hardly believe the change that has taken place." They decided the Oppenheimer had the one thing in the world that he wanted and that this "weaned him from his friends." They were also of the opinion that his wife was influencing him to disassociate himself from all connections with the party or his friends who had been Communists. Steve Nelson says, "To my sorrow, his wife is influencing him in the wrong direction."

I should state that during my investigation of Oppenheimer and my long conversations with him and with his wife it became

very evident to me that Oppenheimer was not going to let anything interfere with his handling of the project or do anything to besmirch his reputation. It was equally evident that Mrs. Oppenheimer was very strongly of the same opinion and was determined that both she and Dr. Oppenheimer should walk the straight and narrow and distance themselves as far as possible from the Communist Party and the people associated with it. I might add that Dr. Oppenheimer, almost alone among the principal scientists never protested my decision to refuse clearance to a person strongly suspected of being Communist Party members or sympathizers. Indeed, he specifically warned me against Joseph Weinberg as being "quite a red."

The project presented special problems with respect to gathering intelligence information as to what, if anything, the enemy was doing with respect to atomic energy. Knowledgeable scientists, particularly those who had fled Nazi Germany, knew that research had been started in Germany. The first experiment which demonstrated the possibility of securing energy from the fission of the uranium atom (the so-called "chain reaction") had been conducted in Germany and the scientific community was certain that full scale work was in progress there. While I did not have charge of this activity while I was in G-2 I knew that nothing was being done. Consequently, I formulated a plan for gathering scientific information at the battle front and in General

Strong's name "lobbied" through the War Department authority to put it into effect. This became the Alsos Mission.⁵ This organization consisted of supportive military personnel and a number of scientists in various fields, some of whom were in the military and some of whom were not, but the whole was under the command of a military officer. We secured the release of Lieutenant- Colonel Boris T. Pash from the Western Defense Command staff to command the Alsos Mission. Details of the activities of the Alsos Mission have been published in a book by Colonel Pash, "The Alsos Mission," Award House 1969, as well as by General Groves in his book "Now It Can Be Told." The basic idea of Alsos was an organization which could conduct investigations of the scientific aspect of weapons virtually on the battlefield before things had been destroyed by military action. While its establishment was due to the urgent need to search for and investigate atomic projects, its charge was broader and its first activity was in North Africa and Italy, at the time of that invasion as a training process. Later, in France and Germany, Alsos was responsible for the retrieval of information concerning the activities of the Germans in atomic energy and gathering up papers and personnel in respect of those activities. This was a very successful venture and the prototype of what later became "scientific intelligence" activities of

5/ Alsos is Greek for grove of trees. General Groves was not too happy about this name for the mission but by the time he found out about it it was too late to change it.

considerable scope. It is interesting to note that in the process of securing authority to organize the Alsos Mission I found that, instead of this being a brilliant idea occurring to me alone, a number of others had thought of it. It was just that we were the ones with enough influence to secure General Staff approval of the idea.

The official U.S. Army history of the Atomic Bomb Project at page 280 asserts that, "Upon receipt of any intelligence information on atomic developments in enemy nations, the Army G-2, the Office of Naval Intelligence, and the Office of Strategic Services as well as other existing intelligence agencies, dispatched a current intelligence report to the Manhattan District for the attention of General Groves. Until the fall of 1943 this reporting system had served to keep the Manhattan commander and other project leaders apprised of at least the accessible areas of enemy atomic activities." It then goes on to assert that in September of 1943 after the Fifth Army had landed in southern Italy, "Groves perceived a unique opportunity for the Army to exploit new sources of information, especially about the German atomic program as the U.S. forces moved up the Italian peninsula." It then asserts that General Groves met with General Strong to explore ways of achieving "this objective" and that shortly thereafter General Strong met with General Marshall and suggested what became the Alsos Mission.

I do not remember it this way at all and I think that I was fully conversant with all activities in this area. Initially our primary source of information about the German project was the information supplied by refugee scientists from Germany. Secondly, British Secret Intelligence, a very efficient organization, was very active in this field and fully shared with us all information which they had. Sir Charles Hambro a member of British Secret Intelligence was an active participant in the British project and in dealing with us. I do not recall any information supplied by the Military Intelligence Service or the Office of Naval Intelligence. We did get some input from the Office of Strategic Services. The information supplied by refugee scientists plus the reports that large quantities of uranium compound stored in Belgium were shipped to Germany caused us considerable concern.⁶ In short, what meager reports we had prior to the Alsos Mission discoveries tended to indicate an active German project. The reports were erroneous. The Germans were, in fact, doing very little and had not even devised, let alone constructed, a self-reacting pile. In fact, the kind of reports we received early on indicate either an active "disinformation" project or, as I think to be the actual fact, simply the judgment of people knowledgeable about the early work in Germany as to what the Germans must be doing given the early

6/ Before the war the Belgian Congo was the principal source of uranium. I understand that uranium compounds were widely used to color ceramics.

start they had in this area and their interest in the Belgian uranium supplies.

The same history suggests that with the landing of the Fifth Army in Italy in September 1943, General Groves, "perceived a unique opportunity for the Army to explore new sources of information especially about the German atomic program as U.S. forces moved up the Italian peninsula." (page 280) This is wholly erroneous. The use of Alsos in Italy was thoroughly discussed between General Groves and me. Neither one of us had any real expectation of discovering anything about the German atomic program in Italy. We did, however, perceive it as a unique opportunity to give what later became the Alsos Mission a dry run or exercise to prepare it for the effort to acquire information about the German atomic program after the Allied landings in Europe. The possibility existed, of course, that there was activity in Italy if the German project were really extensive, because of the presence in Italy, in the very early days, of Professor Fermi who had very early while still in Italy, replicated the fission experiments of Hahn and Meittner mentioned above.

In any event, because of the lack of any sources of intelligence concerning atomic activities by the enemy and because of the feeling that there was no way to get such information except

after the occupation of areas where the research was going on sometime around the middle of 1943, General Groves and I began to discuss ways to accomplish this. Having in mind the course the project was taking in the United States, it appeared that we must devise means of examining activities in universities, of sampling the water in various streams for radioactivity where the streams might have received discharge of cooling water from atomic piles and the like. Having in mind also the destruction that could occur following battle not alone from heavy fighting but in the inevitable looting by victorious front line troops, it was evident that some means had to be devised to move the intelligence gathering activities into the very front line of the fighting activity. As a consequence of this discussion, I devised the plan which later became the Alsos Mission.

I embodied this idea in a memorandum to General Strong having previously secured the approval of General Groves. General Strong approved the idea after I am sure discussions between him and General Groves and the Chief of Staff. It was necessary for a project of this kind to secure the approval of the other divisions of the general staff and in order to secure these approvals I hand carried it to the various divisions. Each of the general staff divisions had some officer whose responsibility included scientific developments of interest to the particular staff division. I had no difficulty in securing the unanimous

approval of the staff. I was somewhat chastened to discover that instead of this being a brilliant idea occurring to me alone each one of the scientific officers with whom I discussed the proposal had had the same general idea. The difference was that we had an important specific objective and everyone agreed that the type of information which was our principal objective was of overwhelming importance. However, it should be noted that while the urgency of investigating the enemy's nuclear activities if any was the impetus for its formation, the objective of the Alsos Mission was not confined to this alone but was to include other new scientific developments related to the war effort. A copy of General Strong's formal recommendation of the Chief of Staff is attached as Appendix E. Incidentally, Vannevar Bush, the head of the National Defense Research Committee, later told me that the information secured by the Alsos Mission in Italy concerning the enemy's developments with respect to proximity fuses was worth the whole venture.

Towards the end of 1943 it was becoming increasingly difficult for me to carry out my regular G-2 assignment in addition to my responsibility for atomic project matters. Moreover, the special organization which I had formed for atomic project work was becoming so large that it was almost impossible for it to operate outside of regular channels any more. At about the same time a reorganization of the War Department was ordered which

made the G-2 Counter-Intelligence organization less compatible with the kind of operation which seemed to be essential for the bomb project. For example, we were required to discontinue the maintenance of centralized investigative records but these were essential to our work. I, therefore, recommended that our activities be moved to the project itself and both General Strong and General Groves agreed. We secured General Staff authority for and organized a special Counter-Intelligence Corps detachment of 25 officers and 137 enlisted agents assigned to the Manhattan Engineer District - the administrative organization for the project. In January of 1944 most of the Counter-Intelligence corp agents in the various service commands and in the Western Defense Command who had been in my special organization were transferred to the new detachment and administrative responsibility was placed in the Manhattan Engineer District at Oak Ridge, Tennessee. The strength of this detachment was later increased to 148 officers and 161 enlisted men. I, with the small staff I had built up for this work in Washington, was transferred to the Corps of Engineers and assigned to General Groves' office. We moved from the Pentagon to the New War Department building on Virginia Avenue where I remained for the balance of the war.

After moving to General Groves' office, I continued the same activities and received many additional duties. For example, an

important activity was the planning and execution of security measures for the special Air Force organization formed to deliver the bomb and which trained at Wendover Field, Utah.

As time went on my activities became more and more of a trouble shooter type. In June and July 1945 I headed a small mission to Brazil where we negotiated with the government for the purchase of monazite sands, a source of the element thorium. We were advised by Maurice McAshan, an Anderson, Clayton and Company official who had a wide acquaintance with the right people in Rio de Janeiro. This was a successful venture though it took, it seemed to me, an excessive amount of time. However, we lived pleasantly in a nice hotel on the waterfront. It is an interesting commentary in view of todays rapid travel that it took from 4:30 P.M. June 23 to 3:20 in the afternoon of June 26 to fly from Washington, D.C. to Rio de Janeiro. We stayed overnight in Miami, Port of Spain, Trinidad and Belem, Brazil. The aircraft was a DC 3. This trip, and a trip to Sweden for the same general purpose immediately following, deprived me of the opportunity to be a spectator at the explosion of the test device in New Mexico on July 16, 1945. Incidentally, we worried considerably about explaining the test explosion which we knew would be and was seen and heard over a rather wide area. In the end a rather casual statement about a "remote ammunition dump" was made and it attracted little attention.

The report to the Secretary of War, dated July 19, 1945 of the success of the test explosion was carried by one of my officers, Major W.A. Consodine, to Secretary Stimson who was with President Truman at Potsdam attending a conference with Stalin and Winston Churchill. A copy of this report is attached as a matter of interest. (Appendix F). I attach also a copy of the report of the Chief of the Medical Section which illustrates some of the concerns about the tests. (Appendix G).

I had returned from Brazil on the 14th of July, 1945. On the 18th, together with Volpe and Vance, I left Washington for London and thence to Stockholm in an attempt to negotiate with the Swedish government for the purchase of a material found in ample quantities in Sweden called Kolm which is, I am informed, rich in uranium. We had a pleasant time in Sweden but despite the close cooperation of the United States Minister (Herschel Johnson) and members of his staff we were unable to make an agreement with the Swedish government, because of their desire to maintain Sweden as a neutral nation. The trip from London to Stockholm was made in a B-25 bomber flying at very low altitude to avoid enemy fighter activity although the war with Germany was essentially over.

I was in Sweden on August 6, 1945 when the first bomb was dropped on Hiroshima, Japan. I still have a vivid mental picture

of the newspaper headlines "Atom Bomben." While in Stockholm, I was included in the diplomatic entertainments to which embassy personnel were invited. I still remember a party at the country home of a prominent banker. We gathered in a sort of summer house for a sit down meal where we were plied with kraftor, a very tasty small shrimp-like creature, and aquavit. I sat next to the hostess who said to me "everyone gets a little tipsy at a kraftor party." About 8:30 p.m. we were led back to the main house where, to my surprise, we sat down to an elaborate dinner where a different wine was served with each of the several courses.

As an illustration of the extent to which we went to avoid telling anyone about the project who did not actually have to know, (in this case the State Department) at General Groves request I personally did sufficient legal research to be able to assure the General that the executive branch of the government had sufficient authority to negotiate agreements with other nations without resorting to the treaty process. Somewhere in the files must be the legal memorandum I wrote on the subject.

Not long after I transferred to General Groves' office, in January 1944, I established an office in London primarily to maintain contact with British Secret Intelligence and the people in London on the British project which they called Tube Alloys.

H. K. Calvert went to London to take charge of that office. The man in British Secret Intelligence with whom we primarily dealt was Sir Charles Hambro, a member of a prominent British banking family ten or twelve years older than most of us. He was a fine gentlemen and our relationship was most cordial.⁷

On the administrative side of the British Tube Alloys project, our principal contact was M. W. Perrin with whom also we had a cordial relationship. He had a cottage near Dover and I still remember with pleasure a day I spent there. I still have somewhere a piece of chalk from the famous chalk cliffs of Dover which I picked up that afternoon. The British Minister in charge was Sir John Anderson, Chancellor of the Exchequer, a very smart man with whom I had contact from time to time. Counsel to the Exchequer, was one Gorrell-Barnes with whom I dealt in connection with the establishment of the so-called Combined Development Trust. (It was for this arrangement that I did the research, noted above, as to the power of the executive branch to negotiate an international agreement.) The Combined Development Trust was established jointly with the British to acquire and own uranium

7/ Shortly after Paris was liberated by the Allies he and I were in Paris together for a specific purpose I do not now recollect. We had dinner together in a Paris restaurant and he ordered the wine. The waiter brought the wine and gave Sir Charles a taste. He tasted it and said "Gad! its corked" and got a fresh bottle. Many years later I realized my ambition to be able to imitate this bit of sophistication when Metta and I were served some bad wine while she and I were having dinner at the Shaker Heights Country Club.

ore and uranium metal. For security reasons, the device of a common law trust was used, to avoid the reporting problems which would otherwise have attended the use of an ordinary corporation. The original instrument for the combined development trust was drafted by me and W. A. Consodine of my office. It was finally negotiated with Gorrell-Barnes in London. In this connection we had a good many dealings with one Edgar Sengier a citizen of Belgium and Chief Executive Officer of the Belgian corporation which operated in the Belgium Congo and owned most of the then known resources of uranium ore. The company was called, I believe, Union Miniere D'Haut Du Katanga. By the time these developments took place, Edmund Durkin of Squire, Sanders and Dempsey was in my organization. In addition to being a fine lawyer, Ed was also fluent in French and he was given the responsibility of dealing with M. Sengier and the other Belgian authorities in exile. This he handled very well indeed. [Ed established a cordial relationship which continued after the war. After Durkin's death I received one day a call from M. Sengier's son who wanted to get in touch with Betty Durkin, Ed's widow.]

In late November, 1944 a flap developed over the desire of a French scientist named Halban who was working on the British portion of the project at an establishment in Canada to visit Paris, which by that time had been liberated, to see and report to one Joliot-Curie. Because the latter was a well-known com-

munist we were very disturbed about this and at the request of General Groves, Mr. Winant our Ambassador to Great Britain was instructed by the President to attempt to prevent this visit.⁸ After some negotiations, Mr. Winant requested that General Groves come to London because he felt that he could not handle the situation. Instead, the General sent me. I found that Halban had in fact been permitted to go to Paris two days before my arrival because of the feeling that it was no longer wise to prevent him. Sir John Anderson believed, and Mr. Winant concurred with him, that any further prevention of Halban's departure would lead to serious difficulty with the French resulting in a public controversy which we could not afford.

One of the jobs I had been given by General Groves was to find out exactly what the arrangement was, if any, between the British and the French. The British were not inclined to be particularly open about this. I had extensive discussions on this point with Sir John Anderson, Mr. Gorrell-Barnes and M. W. Perrin between November 30 and December 10 when I returned to Washington. It appears that Halban and a man named Kaworski, who had gone from France to Great Britain at the time Halban did, and

8/ It should be noted that the State Department knew nothing of the project and Winant's instructions were I was told, given directly by the president at the request of Mr. Stimson, the Secretary of War.

a man named Jay had in 1938 almost simultaneously with others,⁹ discovered the fission of uranium working in the laboratory in Paris headed by Joliot-Curie. In May of 1939 they had applied for patents in France known as A, B, and C, A and B relating to the production of energy by the use of a controllable pile using a suitable moderator and, C, relating to the production of an explosive. The latter was immediately impounded by the French Minister and Perrin had never seen it. (Joliot and the others were professors and, therefore, French civil servants.) In 1940, when the fall of France was imminent, Halban and Kaworski came to Great Britain with their stock of heavy water which was the largest quantity then in existence, all their research reports and two grams of radium and tried to interest the British government in proceeding with a project to develop an explosive. Joliot-Curie remained in France. The United Kingdom was then working on the matter in a desultory fashion and the arrival of the French scientists gave them an added incentive to go into the matter more aggressively. In mid-1942 a written agreement was concluded among the United Kingdom, Halban and Kaworski, under which the latter two conveyed to the United Kingdom all of their interest in the patent applications referred to above. In consideration, the United Kingdom agreed to give France rights in

^{9/} The first publication was by the German scientists Lise Meitner and Otto Hahn.

these patents and in any patents dominated by them. I was advised that Dr. Vannevar Bush was notified of this agreement by a letter from the Chancellor dated 5 August, 1942. (However, the letter to Dr. Bush had simply reported the acquisition of the rights of Halban and Kaworski). Dr. Bush was also notified of the intention to send Halban and Kaworski to Canada to develop a heavy water pile since the United States had decided to concentrate on the graphite pile. The disclosure to me that this Halban-Kaworski agreement embodied an obligation to the French Government was the United States' first knowledge of this.

The point of all this is that the 1943 Quebec Agreement between the United States and the United Kingdom provided that neither would communicate information about atomic energy to third parties except by mutual consent. The 1942 agreement described above as disclosed to me in late 1944 seemed inconsistent with the Quebec Agreement. This seems the more egregious because it was the Chancellor of the Exchequer, Sir John Anderson, the negotiator of the Halban-Kaworski Agreement, who was I understand the principal draftsman of the Quebec Agreement. This matter is discussed more fully by General Groves in his book at page 224 and following. I have my original handwritten notes of my discussions in the United Kingdom.

I returned to the United States in the middle of December and reported fully to General Groves on the French situation. I was not present at the high level meetings among the Secretary of War, General Groves and the President, but I was advised that it was agreed to insist that the British postpone any further passing of information to the French at least until the conclusion of the war. In January I returned to London and my notes show that on the 19th of January 1945 I saw Ambassador Winant and "related to him the events in Washington with reference to the French situation." I note that a report of this conference is in a memorandum to General Groves. I record in my notes also the following:

"Winant is very worried about how he personally is coming out in all of this. I get the impression that that is one of the principal things on his mind. He wants to talk to Harry Hopkins on this--I am sure, to get a favorable word to the President's ear."

My notes show that on January 24, 1945 I saw Lord Cherwell the scientific advisor to Mr. Churchill "to carry General Groves' greetings". I had a pleasant chat with him about the status of the project. Thereafter, I had further meetings with the British particularly with Sir Charles Hambro, M. W. Perrin and a Mr.

Sayre. I cannot now remember who Mr. Sayre was. These discussions were primarily on intelligence matters and particularly regarding the supply of uranium ores. It should be noted that Sir Charles, in addition to his connections with British Secret Intelligence, was part of the governing body of the Combined Development Trust.

By this time the Alsos mission was being reactivated in Europe and Colonel Pash had established headquarters in Paris. Pash in fact, with H. K. Calvert was in the lead jeep in the column of allied troops entering Paris as the Germans pulled out. On January 28, 1945 I went to Paris to review the situation with Colonel Pash. At about the time I got to Paris we received word that the city of Strasbourg had been recaptured. We had information that work on atomic matters may have been carried out at the University there, so Pash and I with a small group drove to Strasbourg which according to my notes, took us from 8:15 a.m. to 11:15 a.m. on January 31. I do not have in my files any notes on this trip. My recollection is that it was somewhat adventurous because fighting was still going on in the vicinity of Strasbourg. In any event, we spent four hours in Strasbourg. My recollection is that we found some scientific reports, but not much information other than verification of the information that we were already beginning to obtain that the German activities with respect to atomic energy were being carried on primarily in

the Black Forest area. We returned to Paris the same day. According to my notes, I returned to London by train on February 3 and left London for Washington on February 6, 1945. I do not have any recollection of my activities in London between the 3rd and 6th of February.

I returned to Europe on April 6, 1945. The background was this. During February and March the Alsos mission people in Europe together with the British had definitely established that the German atomic activities were being carried on in the Black Forest area of Germany in the towns of Haigerloch, Hechingen, Bisingen, and Tailfingen. In the meantime, the allies were dividing up areas of influence in anticipation of the final defeat of Germany and the State Department had tentatively agreed that the area in which these atomic activities were taking place would be within French control. Moreover, the French troops that would advance on this area were colonial troops (Moroccans) particularly noted for their destructiveness in captured cities. Attempts were made by General Groves, with the assistance of the Secretary of War, to get the State Department to attempt a rearrangement of these zones of influence. But, the State Department refused to move without knowing the reason, and we were unwilling to give the State Department the reasons. At the same time, to quote General Groves' statement in his book, "it was of the utmost importance to the United States that we control the entire

area that contained the German atomic energy activity." The background of this matter is stated in General Groves' book at page 233 and following. With the approval of Secretary of War Stimson and the Chief of Staff, General Marshall, a plan known as "Operation Harborage" was initiated. In essence, the plan was that American troops should get into the area where the atomic projects were in operation long enough to capture the people we wanted and to secure the records prior to French occupation of the area. I was advised that General Marshall made it clear that while the War Department approved of this action and considered it "highly important" this was not to be construed as a direction to carry out the operation at all costs.

I was furnished with letters from the Chief of Staff and sent to Europe to get Operation Harborage under way. My diary shows that I left Washington on April 6, 1945 and got to Rheims, France Supreme Headquarters, Allied Expeditionary Forces (SHAEF) on April 8 at 5 p.m. I saw General Bedell Smith, General Eisenhower's Chief of Staff at 5:15 p.m. on that day and delivered to him the letters I was carrying. He had in the meantime, received word directly from the Operations Division of the general staff in Washington and had already talked to Colonel Pash since the Alsos Mission would be an integral part of any such operation. My notes say that General Smith pointed out to me the difficulties and risks of the proposed operation

particularly with reference to the French. He said "we can't fight the French much as I would like to." He told me that he had asked Pash to see the G-2 of the 6th Army Group (a General Harrison) in the area from which the initiation of the proposed operation would have to take place. He asked me to locate Pash and return with him as soon as possible. It took me some time to find Pash. My notes show that on the 10th of April, 1945 I returned to Rheims with Pash where we had a conference among General Smith, General Bull who was G-3 of Eisenhower's staff, General Strong, a British General who was G-2, General Craig who was in charge of the Operation Division of the War Department, General Staff, Washington and Mr. McCloy the Assistant Secretary of War (under whom I had served on the so-called Japanese America Joint Board) who also happened to be there, and Pash and myself. My notes of this meeting are as follows:

"General Bull reported that one corps (three divisions of which two armored) and one airborne division (13th) would be required. Also that Devers would have to be supplied with this force or its equivalent.

"General Strong reported that Hechingen was a German headquarters and an area believed fairly strongly held although the information

was not positive. (Pash reported General Harrison's belief that the area was lightly held) General Strong also reported that our intelligence definitely confirmed the existence of work in that area.....

"General Smith pointed out that Eisenhower's plan called for defense by the 6th Army Group and continued offence in the North. He stated that the 6th Army Group was even now in difficulties and was calling for more support and that the area in question was opposite the French and the French supposed to move down there. Very risky and costly operation and therefore could not recommend to Eisenhower."

I asked if we could, in any event, have bombing in the area. He said yes and also that the 13th airborne division could be held in reserve to drop in ostensibly in support of the French. Furthermore, he said if the tactical situation changed we could probably still pull off Harborage.

General Bull said that the 13th airborne division could move on 72 hours notice. General Smith asked that I get War Depart-

ment confirmation on my recommendation that we both bomb and send in the 13th airborne division. Pash reported, according to my notes, that General Devers (Commanding General of the 6th Army Group) had deprived the French of most of their striking power to hold them up.

By the 11th of April I had the necessary approval from the War Department and according to my notes the matter was "left this way. General Bull understands that we must in all events attempt destruction by air and also if possible get on the ground before (a) the Control Commission takes charge and (b) the French move in. This they will accomplish as soon as possible, and the best way, under whatever circumstances, obtain.

We are to supply pinpoints for bombing."

My diary shows that on the 14th of April I met with Sir Charles Hambro and Major Furman, the latter a part of the Alsos operation, General Strong, SHAEF G-2 and, later, General Smith. My notes then say "Harborage has now been approved to fit in with other operations in the same direction. The timing to depend on the practical situation and the advance of the French. Will be speeded up if French advance further and faster than expected."

In the meantime, we received reports that our troops were advancing in Northern Germany and the possibility existed that certain uranium ores, which we had information had been moved into Northern Germany, might be recovered. On April 15 I, together with Pash, Sir Charles Hambro, [and my notes say, Bullock - I cannot now remember who this was] proceeded to Gottingen via Wiesbaden where we saw General Siebert, G-2 of the 12th Army Group. I showed him the letter I carried from Frank McCarthy that I be "furnished any assistance necessary in the accomplishment of my task." (A copy of this letter is attached as Appendix H to illustrate the kind of authority we were given.) I told him that we wanted to locate and remove some materials that we had information were stored in or near Stassfurt. He was disturbed at our proposal because this area was to be assigned to the Russians and said we must see the commanding general. The commanding general was Bradley who was then in conference with General Simpson of the 9th Army. Both of them gave approval. I well remember General Bradley's remark when he was advised of General Siebert's worry about the Russians: "to hell with the Russians." General Siebert then gave us the necessary letters.

On the 16th of April we drove to Wansleben headquarters of the XIX Corps. On the way up we nervously skirted the Hartz Mountains where fighting was going on. We called on the G-2 of the 9th Army, a Colonel Platt and found that his executive

officer was Lieutenant Colonel W. K. White whom I knew from V.M.I. He was a class ahead of me there. Both were very cooperative and we ascertained that Stassfurt was reasonably clear. On April 17 we proceeded to a place called Calbe, command post of the 83rd infantry division, and got in touch with a Captain deMasse "Chief of M-1 Team for Interrogating Civilians." He guided us to the WIFO plant near Leopold's Hall. We picked up the director of the plant one Shultz and the manager a Mr. Schuman. The plant was a mess from our bombing and the looting by French and American troops. However, the director of the plant had a copy of the inventory which disclosed the presence of the uranium ore that we were looking for and he located the material for us. On the 18th of April I left the party at Wansleben and went back to the 9th Army where I arranged to have two truck companies assigned to transport the material to Hildesheim and then went on Hildesheim and saw the commanding officer a Lieutenant Colonel Hughes of the 692nd Field Artillery who according to my notes "was struggling with the evacuation of 10,000 allied prisoners of war." He told me he could supply guards and we could do what we pleased about the place.

The material was stored in barrels which would have been difficult to handle. However, I located a paper bag manufacturing plant and secured 10,000 paper bags and on the 19th of April we got the evacuation of the uranium ore under way. In

the meantime, Sir Charles Hambro had arranged for air transport to come in to take us back to London. He and I went by plane to Hildesheim where we found that Major H. K. Calvert had the situation well at hand as far as the shipment of the ore to a port was concerned and we flew on to London in Sir Charles' plane. We took with us 20 (which was all the plane would carry) of the liberated British prisoners of war. I might say that they were in shocking physical condition.

In the meantime, General Harrison, the 6th Army Group G-2, had convinced himself that the Black Forest area we were interested in was very lightly held and that Operation Harborage was really not required. On the 23rd of April I proceeded by RAF transport with M. W. Perrin, Eric Welsh, David Gatiker and several others to Heidelberg. We found that indeed the area was not held by German troops at all and the Alsos mission moved quickly down to the area in question. Throughout the trip we found in most of the buildings that the German people had mounted impromptu white flags on staffs extending outside their windows. At Haigerloch we found a laboratory in an underground tunnel which contained an atomic pile equipped with a graphite moderator, but without any uranium in it. The scientific people with us measured the dimensions and quickly ascertained that the pile would not have been self-sustaining because it was simply not big enough. We nevertheless started dismantling the pile.

(See Appendix I). On the 25th of April we went on to Tailfingen where my notes show that we found Otto Hahn and an almost complete set of the German reports on atomic energy. General Groves' book reports that two duPont chemical engineers one Wardenborg and a James Lane walked into the laboratory and asked for Otto Hahn. I don't know where he got that report. My notes show, and I have a vivid recollection, that I personally picked up Mr. Hahn. He was sitting at a desk in his office. He had a suitcase beside him and when I walked in he said in English "I have been expecting you" and came with me without further delay.

On the 26th of April I, with Eric Welsh and M. W. Perrin, interrogated Von Laue, Weissaker, Wirts and Hahn. After much interrogation they agreed to show us the hiding places of their heavy water and uranium. On that day we got the heavy water, stored in metal barrels, out of the cellar of an old mill about 5 kilometers from Haigerloch. The metallic uranium had been buried in a field near Haigerloch and the field then plowed. I attach a picture of us removing the uranium from where it was buried. I am the person on the far right, the person on the left is Eric Welsh, and the fifth person from the left is M. W. Perrin. I do not recall the names of any of the others. I still have a piece of the metallic uranium dug up from that German field. (Appendix J)

On the 28th of April I returned to SHAEF headquarters and arranged for housing for our prisoners and for transportation of the uranium ore picked up at Leopold's Hall to the United Kingdom. I then returned to London where I spent a couple of days going over the captured German papers with the British and then returned home arriving in the United States on May 3, 1945.

The German scientists were confined in a country house in Spa, Belgium where we took the precaution of placing a microphone in the rooms where they met. The transcript of various conversations among them, translated from the German, passed over my desk in due course. I was so pleased with some of two conversations that I copied down pertinent excerpts in long hand and kept them. They were as follows:

21 July 1945

Bagge: "I am convinced they (the Anglo Americans) have used these last three months mainly to imitate our experiments.

Korshing: Not even that, they used them to discuss with their experts their possibilities and to study the secret documents.

Korshing: It is possible that they themselves have already great quantities of heavy water and uranium.

Bagge: That I do not believe."

Then on 6 August 1945 after they had been handed newspaper accounts of the actual dropping of the first atomic bomb, the following took place:

Hahn: I don't believe it.

Hiesenberg: All I can suggest is that some dilettante in America who knows very little about it has bluffed them in saying if you drop this it has the equivalent of 20 thousand tons of high explosive and in reality it doesn't work at all.

Hahn: At any rate Hiesenberg you are just a second rater and you may as well pack up.

Hiesenberg: I quite agree.

Hahn: They are fifty years further advanced than we.

Hiesenberg: I don't believe a word of the whole thing.

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Hahn: If they have really got it, they have been very clever in keeping it secret.

Hiesenberg: I still don't believe a word about the bomb . . . - Goudsmit led us up the garden path.

Korshing: That shows at any rate that the Americans are capable of real cooperation on a tremendous scale. That would have been impossible in Germany each one said the other was unimportant.

Hiesenberg: The physics of it is as a matter of fact, very simple, it is an industrial problem. It would

never had been possible for Germany at all to do anything on that scale.

Sometime in early 1944, or late 1943 General Groves and I discussed at some length the problems of security after the existence of the project became public. The vast number of people working on the project and the substantial amount of information which would be disclosed to knowledgeable persons by the mere fact that a successful atomic explosion had occurred, made the task of determining what information should remain secret and how the limits on public disclosure should be got into the hands of the thousands of people involved seemed rather daunting. After considerable thought, I recommended to General Groves that we should make an attempt to release to the public in definitive form, all of the information which it was deemed wise to disclose from a military standpoint. General Groves agreed to this approach and the result was the so-called Smyth Report. Professor H. D. Smyth, Chairman of the Department of Physics at Princeton University who had not worked on the project, was employed to prepare such a document. This was finished shortly before the test explosion in July 1945 and was released to the public in August after the project became public knowledge with the dropping of the atomic bomb on Japan. Included in the publication is a foreword by General Groves which contains the following statement:

"All pertinent scientific information which can be released to the public at this time without violating the needs of national security is contained in this volume. No request for additional information should be made to private persons or organizations associated directly or indirectly with the project. Persons disclosing or securing additional information by any means whatsoever without authorization are subject to severe penalties under the Espionage Act."

The criteria which governed the extent of the disclosure of scientific information in the Smyth Report is attached as Appendix J. In general, it disclosed those things which would be surmised by knowledgeable scientists from the very fact that a bomb could successfully be made and detonated, plus such information as qualified scientists could be expected to develop in one year's time or less.

Immediately after my return from my unsuccessful trip to Sweden (those who went to Sweden with me, were a Major Vance, who was a scientist, and Joseph Volpe), the General discussed with me the recommendations he should make as to appropriate legislation for the control of civilian use of atomic energy. The result was

the so-called May-Johnson bill. This proposed legislation was drafted in my office primarily by Majors George B. Davis and W. A. Consodine. This legislation contemplated the establishment of a strong organization headed by a single executive who would be controlled by a part time board--substantially in the format of a business corporation. In at least one respect, the bill did not represent our views. I wanted some provisions relative to security written like a traffic law with mild penalties and no need to prove intent. Most security problems arise from carelessness and the pig-headedness of strong personalities who will not accept direction. Laws designed to punish espionage or criminal carelessness with heavy penalties do not reach many of the real security problems. I thought the general laws relating to security were sufficient to handle espionage or attempted espionage and drafted some "traffic laws" in the initial drafts of the May-Johnson bill. However, the Justice Department (read FBI) wanted more aggressive provisions and the kind of regulations I recommended were never suggested to Congress. This bill was introduced in Congress and supported by testimony of General Groves among others. For reasons which I have never understood this May-Johnson bill was regarded as an effort by the military to control the civilian development and usage of atomic energy and drew a great deal of criticism from the scientific establishment. As a result, the May-Johnson proposed legislation failed of passage and instead, the Atomic Energy Commission was created with full time commissioners.

Work on the legislation including helping General Groves' preparation for his testimony before the Congressional committee considering the legislation was my last activity of any consequence before leaving the service. I went on terminal leave in December 1945.

In due course I received two decorations, the Legion of Merit from the United States and the Order of the British Empire, Degree of Commander (CBE) from the British.

I feel that I should make some comment respecting the Oppenheimer case. My first knowledge of this situation was acquired when I was visited in my office in Cleveland in the early months of 1954 by Herbert Marks who told me that Oppenheimer was to be subjected to a hearing to determine whether his security clearance for atomic matters should be lifted and asked me to be a witness on his behalf. (Earlier and for several years Marks had been General Counsel for the Atomic Energy Commission but was then in private practice and of counsel for Oppenheimer.) I agreed to appear as a witness. However, I was astonished that such a proceeding should be had, considering that Oppenheimer had been a participant in and privy to the closest secrets for some twelve years as well as having been a major participant in the creation of the classified information to which it was now proposed he be denied access. The unreality of the whole thing

was aggravated by the fact that, as Herb told me, Oppenheimer's consulting contract with the Atomic Energy Commission had less than three months to run. Thus, if the sole objective was to eliminate his access to confidential material the simple way would be to fail to renew his contract and avoid consulting him for the intervening period of three months.

After Marks left I took the earliest opportunity to go to Washington and see General Nichols, then the General Manager of the Atomic Energy Commission, with whom I talked about the case. General Nichols was, as always, very courteous but said that the matter was entirely out of his hands and in effect "stonewalled" any attempt by me to find out what was going on. I had the same experience with some of my friends still in the security end of the enterprise such as Rolander. (Incidentally I was never again consulted by anybody at the AEC about anything. Previously I had been consulted from time to time pursuant to a consulting contract.)

In due course a hearing was held from the middle of April through the first week of May, 1954. I testified in support of Oppenheimer's loyalty and discretion in security matters along with quite a number of outstanding people such as John J. McCloy, President of the Chase Bank and former Assistant Secretary of War, George Kennan, Dr. Vannever Bush, Dr. Conant and many others.

General Groves testified for Oppenheimer - at least he was called by Oppenheimer's counsel as a witness. He testified to his clearance of Oppenheimer in 1943 and that "he did a magnificent job as far as the war effort was concerned." He testified that if he had the decision to make again he would repose the same responsibility in Oppenheimer and that he had complete confidence in his integrity.

On cross examination he was asked whether he would have cleared Dr. Oppenheimer in 1943 if he had not believed him to essential to the project and if he had not known that he was already deep in the project. The General testified that he would not have cleared him had he not felt that he was essential. (This was of course true in the light of Oppenheim's communist associations. I would not have recommended his clearance if he had not been important to the project). He was also asked upon cross-examination the following (Pg. 171 of the printed record, Gov. Printing Office 1954):

"General in the light of your experience with security matters and in the light of your knowledge of the file pertaining to Dr. Oppenheimer, would you clear Dr. Oppenheimer today?"

The General answered this by saying that he wanted to give his interpretation of the Atomic Energy Act requirement. He read a paragraph from the statute about security matters that the Commission before giving clearance "shall have determined that permitting such person to have access to restricted data will not endanger the common defense or security". He said his interpretation of endanger is that there is a reasonable presumption that there might be a danger. He said it is a case of saying "well he might be a danger . . . and that there is no consideration whatsoever to be given to any of his past performances or his general usefulness or you might say the imperative usefulness. I don't care how important the man is, if there is any possibility other than a tortured one that his associations or his loyalty or his character might endanger." He then went on to say "in this case I refer particularly to associations and not to the associations as they exist today but the past record of the associations. I would not clear Dr. Oppenheimer today if I were a member of the Commission on the basis of this interpretation." This seems wholly inconsistent with his testimony or direct examination (Pg. 165):

"Q. Based on your total acquaintance with him and your experience with him and your knowledge of him, would you say that in your opinion he would ever consciously commit a disloyal act? A. I would be amazed if he did."

I have never been able to understand his whole performance in Oppenheimer hearings. He obviously told Robb that he would testify as given above at page 171 of the record and equally obviously he did not tell Oppenheimer's counsel that this was going on or else such counsel would not have called him as a witness (or certainly should not have). He must have been under some pressure but I do not admire his performance. I have just recently read the whole transcript of the Oppenheimer hearing and various other materials concerning the matter published subsequently. I still believe:

1. The whole proceeding was an outrage. I feel a sense of shame that the highest officials of our government perpetrated it.
2. Oppenheimer was badly advised and his counsel did a poor job of defending him.
3. The hearing itself and the way it was conducted was grossly unfair to Oppenheimer and indeed had somewhat the air of a "railroad" job.
4. I am still unable to find any rational explanation for the whole proceeding other than a desire to hurt or discredit Oppenheimer personally.

Shortly after the war, Oppenheimer resigned as head of the laboratory and became the head of the Institute of Advanced Study at Princeton after a brief interlude of about a year or two as a professor at the University of California at Berkeley and at the California Institute of Technology. However, from the beginning he was a consultant deeply immersed in the policies of this country relative to atomic energy. Among other things he was chairman of the so-called General Advisory Committee consisting of several prominent scientists who were called upon from time to time to advise the Atomic Energy Commission. One of the issues before the Atomic Energy Commission and that part of the military concerned with atomic weapons was whether further attempts should be made to develop a hydrogen bomb - the so-called super. This was a weapon of immensely greater destructive power than the atomic bomb itself. Indeed, it required an atomic bomb explosion to set it off. Some work had been done on the super during the war and in a desultory fashion since. There was a group, a very outspoken member of which was Edward Teller, who thought the United States should be vigorously working to develop the hydrogen bomb. Indeed, his enmity toward Oppenheimer may well have originated in the fact that Oppenheimer refused to divert any of the effort at Los Alamos towards work on the hydrogen bomb with which Teller was very anxious to proceed.

After it became known that the Russians had developed an atomic bomb, around 1951 I believe, the agitation by some "insiders" for the United States to undertake the development of a hydrogen bomb became very vigorous and the question was referred by the Atomic Energy Commission to the General Advisory Committee under Dr. Oppenheimer. The General Advisory Committee by a majority vote recommended against the development of the bomb on the ground that it was doubtful whether the bomb could be made in the first place, secondly that such a terrible weapon should not be developed and thirdly that in any event it was unnecessary. Apparently, also in other ways Oppenheimer tried to discourage the development of the bomb and to persuade others to adopt his view.

President Truman, however, expressly decided that strong efforts should be made to develop a hydrogen bomb and a program was initiated. Not long after work started on it, what Oppenheimer referred to as a "brilliant invention" by Teller enabled such a weapon to be rapidly developed, whereas before this the difficulties of developing a "super" appeared to be almost insurmountable.

Apparently, Lewis Strauss, Chairman of the Atomic Energy Commission, developed a strong dislike for Oppenheimer and was seriously troubled by his opposition to the development of the

so-called super and he had planned to ease Oppenheimer out of his relationship with the Atomic Energy Commission. However, before he had taken any action, a letter accusing Oppenheimer of being a spy for Russia was sent to the FBI by one William Borden. Borden was an executive of Westinghouse Corporation but until a month or two before and for four years he had been chief of staff of the Joint Committee on Atomic Energy of the United States Congress. As such, he had access to the investigation files on Oppenheimer. He had also been troubled by Oppenheimer's opposition to the development of the hydrogen bomb. In any event, for reasons which are not clear, on December 7, 1953 Borden addressed a letter to FBI director J. Edgar Hoover stating his opinion "that more probably than not J. Robert Oppenheimer is an agent of the Soviet Union." In his letter he recites a long list of allegations claimed to support his accusation. All of it was material which was known to us at the time Oppenheimer was cleared in 1943 by General Groves, except the recitation of his opposition to the hydrogen bomb. To quote an article on the Oppenheimer case ("In the matter of J. Robert Oppenheimer" by Barten J. Bernstein in Historical Studies into Physical Sciences) Borden's charges were "a mixture of known information, dubious suspicion and harsh innuendo.") This same author notes that due to his background and position Borden was a man who had to be taken seriously. Following his usual practice in such things (as I noted somewhere above) Hoover sent a copy of this letter without any comment to

the White House where it caused a terrible flap. President Eisenhower ordered that a "stonewall" be placed between Oppenheimer and classified information. Orders went out that classified information should not be discussed with Oppenheimer. Agents were sent to his office at Princeton where all of his files of classified material were picked up and he was invited by Lewis Strauss to resign. Strauss gave him 24 hours to decide whether he would resign stating that if he did not resign he would be subjected to a hearing. Oppenheimer did not resign and a letter was sent to him making a series of charges against him which except for his opposition to the hydrogen bomb were all items dating back to the early years and were known to us in 1943. A hearing board was appointed.

This hearing under AEC rules was supposed to be an "inquiry" not a prosecution. Indeed at the hearings the chairman (page 20 of the printed record) stated:

"At this point I should like to remind everyone concerned that this proceeding is an inquiry and not in the nature of a trial. We shall approach our duties in that atmosphere and in that spirit."

This statement was repeated at least one other time.

However, in point of fact, from the very beginning the hearing was indeed a prosecution and an aggressive one, as well as being conducted in a manner grossly unfair to Oppenheimer:

1. The Commission employed outside counsel to conduct the hearing on behalf of the Commission.

He was Roger Robb a very able and aggressive litigator with much experience. (He later became a Federal District Judge in the District of Columbia and is now dead.)

2. Roger Robb was promptly cleared for access to classified information and was given access to all relevant records of the Atomic Energy Commission, including all of our early investigative file, as was the hearing board itself. However, the request of Oppenheimer's four counsel to be cleared was refused on the grounds that there were too many. When it was requested that one of them be cleared it was refused on the ground that the request came too late.

3. All the files on Oppenheimer were furnished to the Board Members in advance of the hearing and they

together with Roger Robb, without the knowledge or consent of the counsel for Oppenheimer, spent a full week before the hearing going over all of them.

5. Robb was permitted to cross examine Oppenheimer and other witnesses aggressively on the basis of documents which Oppenheimer's counsel were denied the right to see on security grounds.

Throughout the hearing Oppenheimer's counsel acted in pursuit of an obvious policy to do nothing to offend the Board. I find throughout the record only occasional mild objections to some of the more egregious of Robb's unfair tactics.

I might say that I thought at the time of the hearing and so stated to various people that Oppenheimer was most unfortunate in his choice of counsel who apparently had little if any trial experience and did not seem to me to be adequately representing him. Having now read the whole record through it is obvious to me that they were simply not competent to handle this kind of proceeding.

One cannot escape the impression that this whole proceeding was a sort of farce with the outcome predetermined. Indeed, my

understanding is that Mr. Robb who was in every sense a prosecutor participated with the hearing board in its deliberations and indeed assisted in writing the various opinions.

After the adverse decision of the board by a two to one vote an appeal was had to the Atomic Energy Commission which confirmed the determination of the board by a divided vote. It is somewhat ironic to note that a couple of years later President Johnson awarded to Oppenheimer the so-called Fermi Award which was regarded as the highest honor that could be given by the American Government to a scientist. This was given to him in recognition of his many services to the United States. Was this intended as an apology for the shabby treatment he had received? I was somewhat surprised that Oppenheimer accepted. An inveterate smoker, he died in his 60's of cancer of the throat not long afterwards.

I feel that I should add something about my appraisal of General Groves as the head of the project to produce the atomic bomb. The principal administrative agency for the project was the Manhattan District. The administration of all aspects of the project except Los Alamos, including the reservations at Oak Ridge Tennessee and at Hanford, Washington, as well as the various laboratories at several universities and various manufacturers under contract to the District were all under the

District Engineer, Colonel K.D. Nichols. This included physical security and security regulations at all installations except Los Alamos. General Groves, with a small staff in Washington, was in direct overall charge. This included the administration of the reservation at Los Alamos, originally known as Site Y, which reported directly to General Groves' office for administrative purposes and not to the Manhattan District Office. I was assigned to General Groves' office and reported directly to him. All investigating personnel assigned to investigate breaches of security and suspected espionage (other than routine clearance investigations) reported directly to me. We had various branch offices, the largest of which were at Berkeley, California and Chicago, Illinois. The office in London and various overseas activities also reported directly to me and through me to General Groves. I had a very close relationship with General Groves and saw him virtually every day that he and I were both in Washington and we not infrequently traveled together.

One reading the vast amount of literature concerning the atomic bomb project will get a very mixed picture of General Groves and his capacities. One of the most recent volumes, Day One, Before Hiroshima and After by Peter Wyden, presents a very unflattering picture of the General as a sort of bull in the china shop, and a not too bright, arrogant and domineering individual, who took delight in "putting people down". In its general thrust, this is a wholly inaccurate picture.

It is true that General Groves, like many of us, had a very adequate appreciation of his own abilities. The problem was he had no hesitation in letting others know of his own high opinion of himself and his abilities. This is the origin of the feeling that he was arrogant and the reason why many people disliked him. However, I know of no one who worked closely with him who did not have the highest regard for his intellectual abilities and his ability to get things done. He had an uncanny intuition for the right answer. I can remember more than one occasion when he returned something I wrote for him to sign with the notation: "Not right - do it again." On one particularly frustrating case I asked him what he wanted to say. His answer was "If I knew I would have written it. I just know this is not right." The adverse comment comes primarily from those who did not know him well or had little contact with him. The only side of the General that they saw was what they regarded as his arrogant disclosure of his own high abilities. By the time people like Peter Wyden get around to researching and publishing their books some forty years after, most of the people left to talk to are the younger participants who had minor contact with the General or remarks made in diaries or other written memoranda left by the principals of the project who record such matters as that mentioned above.

This is not a suggestion that Mr. Wyden's book is a bad one. It is immensely researched, extremely well-written and reflects

some insights I have not seen elsewhere. However, his picture of General Groves is, as a whole, simply wrong.

General Groves was a man of extraordinary ability and capacity to get things done. Unfortunately, it took more contact with him than most people had to overcome a first bad impression. He was in fact the only person I have known who was every bit as good as he thought he was. He had intelligence, he had good judgment of people, he had extraordinary perceptiveness and an intuitive instinct for the right answer. In addition to this he had a sort of catalytic effect on people. Most of us working with him performed better than our intrinsic abilities indicated.

As the time for the probable attempt to use the atomic bomb against Japan came closer, sentiment developed in various quarters for the idea that the bomb should not be used against the Japanese, at least initially, but that a demonstration should be held on an uninhabited island accompanied by the threat to use it unless the Japanese surrendered. At the same time, some very prominent persons (e.g. Niels Bohr) giving thought to post war problems were advocating the view that full disclosure should be made immediately to the Russians and steps taken to assure international control so as to minimize the possibility of some future atomic war. While I did not participate in the high level conferences considering these problems, I was very much aware of

them because of the security problems presented by the activities of various individuals pursuing these ideas.

While both proposals had some appeal and in an ideal world would have been plainly right they were not practical. Nothing happening since that time has changed by opinion that the course of action actually taken was the right one at least so far as the United States is concerned.

Not the least consideration in the course of action actually adopted was a possibility, very much in everyone's mind, that the atomic bomb dropped might prove to be a dud. This was regarded as a very real danger at the time. Holding a demonstration at which the bomb proved to be a dud would have had, in the view of everyone who really considered it at the time, a very adverse effect upon the future course of the war. Moreover, there was a substantial body of opinion that any kind of a demonstration would not have enabled the emperor or moderates in Japan to overrule the fanatical military. The difficulties we now know that the emperor actually had with the military after the bomb was dropped seems to me to confirm this view. In my view no other course of action than that which was taken would have ended the war so quickly and with such little additional loss by the part of the allies. Recent literature particularly Wyden's book above referred to has dwelt on the death and destruction

inflicted on Japanese civilians. Japan aggressively initiated the war against the United States and for several years prior thereto carried on what was regarded as a barbaric war in the far east. Not many people had much compassion for the Japanese.

As for disclosure to the Russians and attempts to establish international control and forestalling the Russian or other nations from developing atomic capabilities, I do not see how even today, anyone who gives consideration to the character of the Russian government at that time, particularly the Russian dictator Stalin, can believe that such a proposal would have had any chance whatsoever for success. I, myself, believe that it is the existence of stock piles of atomic weapons which has been largely responsible for the freedom of the world from a major war during the past 40 years.

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THE NEW FRONTIERS IN THE ATOM¹

By Professor ERNEST O. LAWRENCE

THE UNIVERSITY OF CALIFORNIA

THE anniversary celebration of a great university is indeed an important occasion, and it is appropriate to signalize the event by a symposium on "The University and the Future of America," for a great institution of learning is eternally youthful, and youth looks always to the future. I am greatly honored to be included in this distinguished gathering, and it gives me especial pleasure to join in wishing our sister institution many happy returns.

In a discussion bearing on the future, the scientist is always in something of a dilemma. On the one hand, he is cautioned to make only very limited prog-

nostications, for he has learned the very limited region of applicability of existing knowledge and the likelihood of error in speculation. On the other hand, he faces the future with eager excitement and curiosity about what is beyond the present frontiers of knowledge, and he is naturally tempted to speculate and indeed to indulge in daydreams. Perhaps I may convey something of what is in the minds of physicists these days by a brief discussion of some recent developments of the current intensive attack on the new frontier in the atomic world—the nucleus of the atom.

ATOMS

The atomic constitution of matter has long been a keystone of natural science. At the beginning of this

¹ An address delivered at the fiftieth anniversary celebration of Stanford University, June 16. It will appear with illustrations in a volume to be published by the Stanford University Press.

century it was a keystone in a structure having as pillars the principles of the conservation of energy and the indestructibility of matter. In the nineties, it was almost axiomatic to say that the building blocks of nature are the atoms—indivisible, indestructible entities, permanent for all time. But the discovery of radioactivity altered all this. There followed the discovery of the electron and the proton as smaller and more fundamental constituents of matter and the atom itself became the happy hunting ground of the experimental physicist. Atomic physics developed rapidly; for the atom was found to be a domain of almost incredible richness, and to-day, thanks perhaps to the newspapers, our children speak knowingly of smashing atoms!

To explain the wonderful phenomena of radioactivity, Rutherford came forward in 1904 with a revolutionary hypothesis which reduced the complicated and mysterious observations of radioactivity to simple order. According to Rutherford, not all the atoms have existed for ages and will exist for all time, but there are some atoms in nature that are energetically unstable and in the course of time, of their own accord, blow up with explosive violence. These are the natural radioactive substances, and the fragments given off in the atomic explosions are the observed penetrating rays.

It was not long before Rutherford's hypothesis was established as a law of nature and formed a greater keystone, replacing the chemists' conception of the atom and serving as a foundation for a new science, the science of the atomic nucleus.

Time does not permit an adequate historical résumé of the development of nuclear physics, but for the present purpose it is sufficient to say that the ideas of Rutherford and Bohr on the structure of atoms are now firmly established. There is an abundance of evidence that an atom consists of a nebulous cloud of planetary electrons whirling about a very dense sun, the positively charged nucleus, and that it is in the nucleus that the atomic explosions of radioactivity occur. Indeed, our assurance that this is so rivals our confidence that the planets revolve about the sun!

ATOMIC NUCLEUS

Let us now proceed immediately to a consideration of the structure of the nucleus. The nucleus consists of a closely packed group of protons and neutrons, elementary building blocks of nature some 2,000 times heavier than the electrons. The neutrons are electrically neutral while the protons carry positive charges and for each proton in the nucleus there is a corresponding negative electron outside, for the atom as a whole is uncharged. Since the number of electrons

outside determines the ordinary chemical and physical properties of the atom, it follows that the nuclear charge determines the place of the atom in the periodic table of the elements.

Thus, the nucleus is the body and soul of the atom. More than 99.9 per cent. of the atom's mass is in the nucleus and the nuclear charge determines the nature of the atom, its chemical and physical properties.

TRANSMUTATION OF THE ELEMENTS

These considerations reduce the age-old problem of alchemy to simple terms. For we see to change one element into another is simply to change the nuclear charge, i.e., the number of protons, in the nucleus. The subject of transmutation of the elements has recently received a great deal of attention in the laboratory. All sorts of transmutations have been produced in a minute scale—helium has been made from lithium, magnesium from sodium and even mercury has been turned into gold. The day may come when we will indeed possess the philosopher's stone and will be able to transmute the elements on a grand scale. But interesting as these developments are, I should like to draw your attention to two other subjects, artificial radioactivity and the question of tapping the vast reservoir of energy in the nucleus of the atom.

ARTIFICIAL RADIOACTIVITY

One of the early results of atomic bombardment was the discovery that neutrons could be knocked in or knocked out of the nucleus to produce radioactive isotopes of the ordinary elements. Thus, for example, the nucleus of the ordinary sodium atom contains 11 neutrons and 12 protons, 23 particles in all, and so it is called sodium 23 (or Na^{23}); and by bombardment it was found that a neutron could either be added to make sodium 24 or subtracted to make sodium 22, both isotopic forms not occurring in the natural state. The reason that these synthetic forms are not found in nature is that they are energetically unstable. They are radioactive and in the course of time blow up with explosive violence. Sodium 24 has a half-life of 14.5 hours, i.e., it has an even chance of disintegrating in that time, turning into magnesium by the emission of an electron. Sodium 22, on the other hand, has a half-life of 3 years and emits positive electrons to turn into stable neon 22.

These artificial radioactive isotopes of the elements are indistinguishable from their ordinary stable relatives until the instant they manifest their radioactivity. This fact deserves emphasis, and it may be illustrated further by the case of chlorine. Chlorine consists of a mixture of two isotopes, 76 per cent. of Cl^{35} and 24 per cent. of Cl^{37} , resulting in a chemical

atomic weight of 35.46 which is the average weight of the mixture. By elaborate technique, to be sure, it is possible to take advantage of the extremely slight difference in chemical properties and bring about separation of these isotopes, but in ordinary chemical, physical and biological processes, the chlorine isotopes are indistinguishable and inseparable. The artificial radioactive isotopes Cl^{34} and Cl^{36} are likewise indistinguishable. In fact, Cl^{34} is more nearly identical in properties to the natural isotope Cl^{35} than is the other natural isotope Cl^{37} . And again I would say that the radioactive characteristic of Cl^{34} becomes evident only at the moment it blows up to turn into the neighboring element sulfur.

RADIOACTIVE TRACER ATOMS

In these radioactive transformations of the artificial radioactive isotopes, the radiations given off are so energetic that the radiations from individual atoms can be detected with rugged and reliable instruments, called Geiger counters. Thus, radioactive isotopes can be admixed with ordinary chemicals to serve as tracer elements in complicated chemical or biological processes.

As an illustration of the power of this new technique of labeling and tracing atoms, let us consider iodine in relation to the thyroid gland. It is well known that the thyroid takes up and stores iodine, and this fact can be demonstrated strikingly by feeding an individual iodine including a small quantity of radioactive iodine. Before the feeding, the radioactivity of the food can be measured by placing it near a Geiger counter, thereby giving a measure of iodine content. Later the progress of the iodine through the body can be observed by placing the Geiger counter next to various parts of the body. Likewise, the proportion of the fed iodine in the various body fluids at any time can be determined quickly by taking small samples of the fluids and measuring their radioactivity. After some hours it is found that a large part of the iodine taken in has collected in the thyroid, a fact that is readily established by placing a Geiger counter next to the gland [lantern] and observing the activity while finding no appreciable activity elsewhere. This technique makes it possible to study the behavior of the thyroid in health and in disease, and much interesting work along this line has been carried out recently.

RADIO-AUTOGRAPHY

Although the tracer elements are readily detected with the Geiger counter, there is a photographic method which for many purposes has obvious advantages. This method is sometimes called radio-autography and is illustrated by the lantern slide. Here a

minute amount of radioactive phosphorus in the form of sodium phosphate was added to the nutrient solution of a tomato plant, and after a day or so leaves were placed against a photographic film enclosed in a light-tight paper envelope. The penetrating rays from the radioactive phosphorus produced the developed contact image shown, which gives an accurate and detailed picture of the uptake of phosphate by the plant. Now, indeed, the same method works very well also for the thyroid, as is shown in the lantern slide, which is a photomicrograph of a thin section of thyroid tissue containing radio-iodine; alongside is the radio-autograph obtained from the same micro section by placing it against a photographic plate. The distribution of the iodine in various parts of the gland is shown in surprising detail.

Similarly striking radio-autographs of the distribution of phosphorus and strontium in rats are shown in the lantern slide. Here two rats were fed radio-phosphorus and radio-strontium respectively, and then some hours or days later they were sacrificed, and frozen sections of the entire bodies of the animals were placed against a photographic plate. The resulting radio-autographs show clearly that both strontium and phosphorus are selectively deposited in the bones, phosphorus being more widely distributed in other tissue. The distribution of the strontium in the bones also appears to be quite different from that of phosphorus as radio-autographs of the sections of bones clearly show [lantern].

These examples serve to illustrate the power of the new technique of radioactive tracer atoms. It has often been said that the progress of science is the progress of new tools and new techniques, and I think we may look forward to accelerated developments in biology resulting from the tracer elements.

ARTIFICIAL RADIOACTIVE SUBSTANCES IN THERAPY

It is somewhat afiel for me to discuss medical problems, but I should like to direct your attention to the possibilities of the artificial radioactive substances in the treatment of cancer and allied diseases. It is well known that at the present time there are two main approaches to the treatment of neoplastic disease, surgery and radiation. It is sometimes possible to cut out a cancer completely and effect a cure, and in other circumstances, it is possible to destroy a tumor by irradiation with x-rays or radium. The mechanism whereby the radiation destroys the tumor without destroying an excessive amount of surrounding normal tissue is doubtless extremely complicated, but in any case it is evidently important to localize the radiation to the tumor as much as possible. Perhaps the ideal would be approached if a means were at hand to

irradiate each and every malignant cell without irradiating a single normal cell.

The artificial radioactive substances open for the first time the possibility of an approach to such selective irradiation of tissue. The above examples of tracers suggest the treatment of thyroid tumors with radioactive iodine, bone tumors with radioactive strontium and radioactive phosphorus. These possibilities are being investigated as is the more specific problem of finding a radioactive substance that is selectively taken up by tumor tissue. If there were time, I should like to describe work along this line in progress in several laboratories, and especially to speak of the important progress that is being made in the treatment of leukemia, but I must content myself with only mentioning these new developments in medicine, which are so promising for the future.

ATOMIC ENERGY

For a long time astronomers have been vexed with a problem, the problem of the source of stellar energy, for there is evidence that the sun has been blazing at its present brilliance for thousands of millions of years, and no ordinary fuel could be responsible for such an eternal fire.

The discovery of radium posed to the physicist a similar difficulty; for it was found that radium gives off every hour enough energy to heat its own weight of water to boiling, and this it continues to do for more than a thousand years. Such a vast source of energy in the radium atom was as difficult to understand as the evidently limitless store of heat in the sun. The problem was of fundamental interest and all sorts of possibilities were considered even to the abandonment of the principle of the conservation of energy.

But the first clue to the solution of the problem appeared in 1905 when Einstein announced the theory of relativity. One of the revolutionary consequences of the theory was that matter is a form of energy and that presumably in nature processes go on in which matter is destroyed and transformed into more familiar forms of energy such as heat, radiation and mechanical motion. The relativity theory gave as the conversion factor relating mass to equivalent energy, the square of the velocity of light, a very large number, even to an astronomer! Thus, the theory indicated that, if a glass of water were completely destroyed, more than a billion kilowatt hours of energy would be released, enough to supply a city with light and power for quite a time!

This exciting deduction was immediately accepted by the astronomers, who said, "Doubtless within the sun conditions are such that matter is being trans-

formed to heat. Thus, slowly through the ages the sun is losing mass; its very substance is radiating into space."

Likewise, the physicists, who had other compelling reasons for accepting the Einstein theory, concluded that the source of the energy in the radium atom was a destruction of matter in the atomic explosion giving rise to the penetrating rays.

Although the fundamental assumptions on which the relativity theory was based were evidently sound, and the explanations of the source of energy of the sun and stars and radioactivity were most attractive, until direct experimental verification was forthcoming, Einstein's great deduction could not be regarded as an established law of nature.

The first direct evidence of the truth of this fundamental principle was obtained in the first atom-smashing experiments a decade ago. It was observed that, when the nucleus of a lithium atom is hit by a proton having a kinetic energy of less than a million electron-volts, the result is the formation of two helium nuclei which fly apart with an energy of more than 17 million electron-volts; thus in the nuclear reaction in which hydrogen and lithium unite to form two helium atoms, there is a great release of kinetic energy.

Now one of the interesting and important occupations of the experimental physicist has been the measurement of the masses of atoms and the weights of atoms are known with great precision—much greater than any individual knows his own weight. In particular, it was known precisely that a lithium atom and a hydrogen atom have a total weight slightly greater than the weight of two helium atoms, and it was a great triumph for the Einstein theory when measurements showed that the excess kinetic energy with which the helium atoms flew apart in the hydrogen-lithium reaction corresponded exactly with the disappearance of mass according to the mass energy relation. Literally hundreds of similar nuclear reactions have been studied in the intervening years, and in each instance the Einstein relation has been verified. At the present time this great principle has as firm an experimental foundation as any of our laws of nature.

URANIUM FISSION

Now that it is an experimental fact that matter can be converted into energy, it becomes of great practical importance to inquire whether the vast store of energy in the atom will be tapped for useful purposes. This question has recently taken on added interest through the discovery of a new type of nuclear reaction involving the heavy element uranium.

It has been known for some years that the heavy

elements, such as lead, gold and uranium, are relatively heavier than the middle weight elements, as copper and iron, or more precisely that the average weight of the neutrons, protons and electrons in the heavy elements is greater than their average weight in the atoms near the middle of the periodic table. Accordingly, it is to be expected that, if heavy atoms were split approximately in two, forming corresponding middle weight atoms, there would be a vast release of energy corresponding to the disappearance of matter in the transformation. Indeed, from known values of the masses, it can be calculated on the basis of Einstein's mass-energy relation that each splitting or fission, as the process is called, of a uranium atom into two approximately equal parts releases an energy of about 200 million electron-volts, which is millions of times more heat per atom than is given off when ordinary fuel is burned. Thus, calculations show that 100 pounds of uranium would yield a billion kilowatt hours, which at one cent per kilowatt hour would be ten million dollars' worth of electrical energy.

For some time these considerations were largely academic because no way was known for producing fission of the heavy elements. But interest in the matter has now become extremely lively as a result of the discovery that fission of uranium is actually brought about by bombarding it with neutrons.

The phenomenon has, during the past two years, received intensive study in laboratories all over the world, and several salient facts have emerged. First, the rare U^{235} isotope undergoes fission after absorption of a slow neutron. Second, the energy released in the fission process has been measured; and, as expected, it is found that, when a neutron having an energy less than an electron-volt enters the U^{235} nucleus, about 200 million electron-volts of energy is released. Third it is found also that the fission process is so violent that usually the U^{235} nucleus does not break up into two parts only, but more often several neutrons are given off in addition to the two large fragments.

That neutrons are generated in the fission process is of the greatest interest because it opens up the possibility of a chain reaction, a series of nuclear reactions wherein the neutrons liberated in one fission process go on to produce additional fissions in other atoms which in turn give rise to more neutrons which produce further fissions and so on. It is this possibility of a chain reaction that has excited the interest in uranium as a practical source of atomic energy.

Without going into further detail, it is perhaps sufficient to say that there is some evidence now that, if U^{235} could be separated in quantity from the natu-

ral mixture of the isotopes, a chain reaction could, indeed, be produced. But herein lies the catch, for there is no practical large-scale way in sight of separating the isotopes of the heavy elements, and certainly it is doubtful if a way will be found.

But I should not want to indicate that the uranium matter is a disappointment, that after all we shall never find a way to bring about fission of the heavy elements for useful purposes. Quite the contrary!

The present situation is not unlike the circumstances fifty years ago surrounding the then great question of whether man would ever be able to fly. In those days the fundamental laws of classical mechanics were known, and they allowed the possibility of heavier than air flight. Moreover, there was an abundance of supporting observational evidence that flight should be possible; there were kites and there were the birds of the air. But man's realization of the dream awaited primarily the development of the combustion engine, a circumstance not so evidently connected with the fundamental problems of flight. Likewise the fundamental laws of nature recently revealed to us allow the possibility of obtaining useful nuclear energy, and radium and the sun and stars bear witness that this vast source of energy is being tapped in nature. Again success in this direction may await the development of a new instrument or technique just as the airplane depended on the gas engine.

Perhaps the problem awaits a deeper understanding of the forces that hold nuclei together. That there are little understood forces operative in the nucleus is more than evident; especially from observations of the cosmic rays, it has been established that particles of matter called mesotrons of intermediate mass between electrons and protons play a dominant role in nuclear structure. Theoretical considerations suggest that the mesotrons may be connected with the primary forces in the nucleus, and accordingly, an understanding of mesotron forces may ultimately yield the solution of the practical problem of atomic energy.

THE GIANT CYCLOTRON

In order to study experimentally the mesotron problem, it is necessary to bombard nuclei with atomic projectiles having energies in the range of 100 million electron-volts rather than in the neighborhood of 10 million electron-volts at present available in cyclotron laboratories. To this end a giant cyclotron is now under construction on Charter Hill in Berkeley, and I should like to conclude with some pictures of this great machine. Whether it will be the key to the vast store of energy in the atom, what new discoveries, what new insight into nature it will bring—only the future will tell!

OBITUARY

HOWARD WALTON CLARK

HOWARD WALTON CLARK, curator of the department of ichthyology of the California Academy of Sciences, died on August 10, after a short illness. He was born in Allen County, Indiana, on September 9, 1870, gained his early education in public schools, and graduated from Indiana University in 1896, receiving the A.M. degree in 1901. From his earliest boyhood his interests turned toward natural history, and it almost instinctively became his life work. He served as preparator in the Field Museum, Chicago, from 1901 to 1904, and as assistant in the U. S. Bureau of Fisheries from 1904 to 1909. From 1910 to 1923 he was scientific assistant in the Biological Station of the U. S. Bureau of Fisheries at Fairport, Iowa, largely engaged in the study of the life history and economic importance of the fresh-water mussels and similar problems. In 1923 he went to California and served as collector and aquarist for the newly opened Steinhart Aquarium of the California Academy of Sciences until 1925, when he became assistant curator of the department of fishes in the museum of the academy from 1925 to 1933, and the curator of ichthyology from 1933 until his death.

Mr. Clark was a versatile naturalist, equally at home in both zoology and botany, a keen and tireless observer in the field and laboratory. Aside from a considerable number of other publications in systematic zoology and botany, his collaboration with the late Dr. Barton Warren Evermann produced their masterly study "Lake Maxinkuckee, a Physical and Biological Survey," in two volumes, issued by the Department of Conservation of the State of Indiana in 1920, which stands as a classic in its field. In addition to much of the first volume the second, dealing with the flora of the region, is almost entirely the work of Mr. Clark. It is based upon field studies extended through several years at intervals, and much interrupted by other work, and is not merely a list of plants collected, but is rich in ecological detail, enlivened here and there with bits of description of high literary merit. As joint author with David Starr Jordan and Barton Warren Evermann he published in 1920 their large "Check List of the Fishes and Fish-like Vertebrates of North and Middle America," invaluable for the systematic ichthyologist. The extension and revision of this work has been continuously carried on by Mr. Clark since its appearance with the idea in mind of a revised edition. In addition to his own studies he edited the notices of ichthyological literature appearing in *Biological Abstracts* since its foundation, and countless careful reviews appearing in it were his faithful work.

A man of wide interests, a cordial and sincere personality, blessed with a keen sense of humor, he was at all times helpful and stimulating to his colleagues, and ever ready to promote their interests and those of the academy he served so well.

F. M. MACFARLAND

CALIFORNIA ACADEMY OF SCIENCES

DEATHS AND MEMORIALS

DR. WILLIAM NEWTON LOGAN, until his retirement in 1936 professor of economic geology and mineralogy at Indiana University and state geologist of Indiana, died on August 27 in his seventy-second year.

AUGUST EIMER, who retired ten years ago as president of the drug and chemical firm of Eimer and Amend, New York City, died on August 28.

THE death by suicide on August 25 is reported of Walters Moseley, professor of chemistry and head of the department of Tulane University. He was fifty-three years old.

DR. A. J. CLARK, professor of materia medica in the University of Edinburgh, died on July 30 at the age of fifty-six years.

A WIRELESS dispatch to *The New York Times* dated August 26 states that Dr. Kazimierz Bartel, professor of mathematics at the University of Lwow and at the Polytechnic Institute, prime minister of Poland from 1926 to 1930 and senator in 1935, has been shot by the Gestapo. The dispatch states that sixty professors of the University of Lwow, in which Professor Bartel taught, have been arrested and that their fate is unknown. According to the Associated Press, Professor Bartel refused to leave Lwow when the Russians withdrew after the outbreak of the German-Russian war, and was arrested when the Nazis took over the city. He was fifty-nine years old.

THE correspondent of the *London Times* at Buenos Aires, under date of August 4, writes: "In the presence of the British and United States Ambassadors, a bronze plaque was unveiled yesterday to the memory of William Henry Hudson at Burazategui, in the province of Buenos Aires, to commemorate the centenary of the writer's birth. Dr. Fernando Pozzo, president of the Committee of Homage, announced the foundation of the Association of the Friends of Hudson, whose chief objects, he said, would be to acquire the property of Veinte y Cinco Ombues, in Quilmes, the suburb of Buenos Aires where Hudson was born, and to create there a bird sanctuary and a museum of ornithology."



WAR DEPARTMENT

P. O. Box 2610
WASHINGTON, D. C.

REFER TO FILE NO. _____

14 May 1945

MEMORANDUM for General Groves:

1. 12 May 1945 I was advised by Col. Davenport, Office Chief of Staff White House liason, that the Roosevelt executors have taken the position that all papers in the White House, of whatever nature, are the private property of the Roosevelt estate. He stated that it appeared that they had made their point with the exception that certain of the papers were to be sealed and deposited in Archives until the conclusion of the war.

2. Col. Davenport advised that the papers of interest to us had been found sealed and had been placed in Archives without breaking the seal. General Marshall has sent a note to the President requesting that he obtain the papers as soon as possible and forward them to the Chief of Staff's office.

3. The only documents known to be in the White House are your report of 21 August 1943 and the two memoranda transmitted to the President by Mr. Baker through Justice Frankfurter.

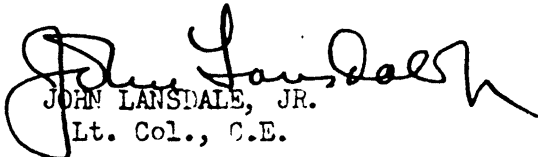
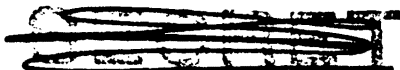
DECLASSIFIED

E.O. 11652, Sec. 1.3(E) and 1.5(D) or (E)

Authority

By *EXC* NAKS, Date *6/5/74*

NND


JOHN LANSDALE, JR.
Lt. Col., C.E.

~~SECRET~~

APPENDIX C

REPRODUCED AT THE NATIONAL ARCHIVES

6 July 1943.

MEMORANDUM FOR GENERAL GROVES:

Subject: J. R. Oppenheimer.

1. It is believed that you should tell Oppenheimer substantially that we know that the Communist Party, U.S.A., is attempting to discover information about the DSM Project for the benefit of the U.S.S.R. That we know who some of the traitors engaged in this activity are--others we don't know, but that because of this it is deemed essential to remove from the Project all persons who are members of the Communist Party or who investigation discloses are followers of the Communist Party line.

2. It is believed that he should further be told that the discharge of no one will be required except upon very substantial evidence of their complicity in Communist Party activities.

3. It is believed that he should also be informed that we will not require or request any mass discharges, but will proceed slowly.

4. He should be told that we have hesitated to take him into our confidence in this matter which has been under consideration for some time, because of his known interest in the Communist Party and his association with and friendship for certain members of the Communist Party.

5. In this connection, Oppenheimer has been associated with the following Communist front organizations:

American Civil Liberties Union
Committee to Aid China
Consumers Union
The Berkeley Conference for civic Betterment
The American Committee for Democratic and Intellectual Freedom

6. He has the following friends or associations, who are definitely Communist Party members or connected with its activities:

WILLIAM SCHNEIDERMAN, California State Secretary of the Communist Party.

DECLASSIFIED

E.O. 11652, Sec. 3(E) and 5(D) or (E)

Authority NAO 75012

By CD/52 NARS, Date 17 FEB 1976

(I)

~~SECRET~~

STEVE NELSON, member of the National Committee of the Communist Party of the United States, and the Communist Party organizer of Alameda County, California. Also, Comintern Apparatus agent in connection with this Project.

RUDY LAMBERT, paid functionary of the Communist Party in San Francisco.

DR. HANNAH L. PETERS, organizer of the Doctors Branch, Professional Section, Communist Party, Alameda County, California.

ISAAC FOLKOFF, finance functionary in the Communist Party activities, largely undercover.

DR. THOMAS ADDIS, sponsor of almost all Communist front groups in California area.

Professor HAAKON CHEVALIER, Professor of French at University of California, probably a member of the Communist Party.

DR. ALEXANDER S. KAUF, Professor of Slovak languages in University of California, believed to be a Communist Party member.

JEAN TATLOCK, with whom Oppenheimer is alleged to have an illicit association, who appears to have some connection with Steve Nelson.

7. In this connection, it should be noted that BERNADETTE DOYLE, assistant to Steve Nelson, is reported by a very reliable informant to have referred to J. R. Oppenheimer and his brother, Frank, as being regularly registered within the Communist Party.

8. The above information as to Oppenheimer's associations, and the opinion of Bernadette Doyle is set out for your information in evaluating the comments of Oppenheimer. It is not believed that Oppenheimer should be taxed with being an associate of Steve Nelson and Bernadette Doyle. He should be asked, if the opportunity arises, who he knows that are members of the Communist Party, for the purpose of seeing what, if any, associations he will attempt to conceal.

FOR the A. C. of S., G-2:

JOHN LANSDALE, Jr.,
Lieut. Colonel, Field Artillery,
Chief, Investigation & Review Branch, CIG, MIS.

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REPRODUCED AT THE NATIONAL ARCHIVES

20 July 1943.

SUBJECT: Julius Robert Oppenheimer

TO: The District Engineer
U. S. Engineer Office
Manhattan District
P. O. Box 42, Station F
New York, N. Y.

1. In accordance with my verbal directions of 15 July it is desired that a clearance be issued for the employment of Julius Robert Oppenheimer, without delay, irrespective of the information which you have concerning Mr. Oppenheimer. He is absolutely essential to the project.

L. R. GROVES,
Brigadier General, C.E.

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DECLASSIFIED

E.O. 11652, Sec. 3(E) and 5(D) or (E)

Authority ND 750112By CD/SR NARS, Date 17 FEB 1976

(4)

301 (Oppenheimer, Julius R.)

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25 September 1943

REPRODUCED AT THE NATIONAL ARCHIVES

MEMORANDUM TO: CHIEF OF STAFF, WASHINGTON, D. C.

I. DISCUSSION

1. While the major portion of the enemy's secret scientific developments is being conducted in Germany, it is very likely that much valuable information can be obtained thereon by interviewing prominent Italian scientists in Italy.
2. The scope of inquiry should cover all principal scientific military developments and the investigations should be conducted in a manner to gain knowledge of enemy progress without disclosing our interest in any particular field. The personnel who undertake this work must be scientifically qualified in every respect.
3. It is proposed to send at the proper time to allied occupied Italy a small group of civilian scientists assisted by the necessary military personnel to conduct these investigations. Scientific personnel will be selected by Brigadier General L. R. Groves with the approval of Dr. Bush and military personnel will be assigned by the Assistant Chief of Staff, G-2 from personnel available to him. A plan of organization is attached. Tab A.
4. This group would form the nucleus for similar activity in other enemy and enemy occupied countries when circumstances permit.
5. The plan has the concurrence of Dr. Bush.

II. ACTION RECOMMENDED

1. That the plan as outlined herein be approved.
2. That the Assistant Chief of Staff, G-2 and Brigadier General Groves be directed to take the necessary steps to put the foregoing plan into effect as soon as the necessary arrangements can be made with the theatre commander.

DECLASSIFIED
E.O. 11652, Sec. 2(e)
NND 730039
By EAC NARS, Date 6-4-74

G. V. STRONG,
Major General, Ass't Chief of Staff, G-2

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TAB A

1. The detachment will consist initially of:
 - a. 1 Commanding Officer - Colonel or Lt. Colonel
 - b. Not more than 6 Interpreters of various grades
 - c. Not more than 6 Counter Intelligence Corps Special Agents as investigators, of various grades.
 - d. Not more than 6 scientists - civilian or military of various grades.
2. The civilian scientific personnel will be made available by the OSRD. All scientific personnel will be instructed by OSRD and Brigadier General Groves.
3. The Commanding Officer will be responsible directly to the Assistant Chief of Staff, G-21. Personnel of this group will be sent to the theatre on temporary duty and attached to the Theatre Commander for administrative purposes. All scientific information will be forwarded direct to Washington to Major General G. V. Strong, Assistant Chief of Staff, G-2.

~~RESTRICTED DATA~~
 ATOMIC ENERGY ACT OF 1954

~~TOP SECRET~~
~~SECRET~~

18 July 1945

MEMORANDUM FOR THE SECRETARY OF WAR.

 Classification Cancelled or Changed
 To ~~SECRET~~
 By Authority of ~~SECRET~~

SUBJECT: The Test.

 Name Title Date
 H. A. ... 3-17-61

1. This is not a concise, formal military report but an attempt to recite what I would have told you if you had been here on my return from New Mexico.

2. At 0530, 16 July 1945, in a remote section of the Alamogordo Air Base, New Mexico, the first full scale test was made of the implosion type atomic fission bomb. For the first time in history there was a nuclear explosion. And what an explosion!

SENSITIVE INFORMATION DELETED

The bomb was not dropped from an airplane but was exploded on a platform on top of a 100-foot high steel tower.

3. The test was successful beyond the most optimistic expectations of anyone. Based on the data which it has been possible to work up to date, I estimate the energy generated to be in excess of the equivalent of 15,000 to 20,000 tons of TNT; and this is a conservative estimate. Data based on measurements which we have not yet been able to reconcile would make the energy release several times the conservative figure. There were tremendous blast effects.

RESTRICTED DATA

 ATOMIC ENERGY ACT OF 1954 ~~SECRET~~

DECLASSIFIED

NARS, Date 8-17-82

 UNCLASSIFIED
 To
 By authority of: SEC. A-100
 12/17/66 DEC 7/10/54
 9/25/71 WIK. NARS

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Memorandum for Secretary of War

18 July 1945

For a brief period there was a lighting effect within a radius of 20 miles equal to several suns in midday; a huge ball of fire was formed which lasted for several seconds. This ball mushroomed and rose to a height of over ten thousand feet before it dimmed. The light from the explosion was seen clearly at Albuquerque, Santa Fe, Silver City, El Paso and other points generally to about 180 miles away. The sound was heard to the same distance in a few instances but generally to about 100 miles. Only a few windows were broken although one was some 125 miles away. A massive cloud was formed which surged and billowed upward with tremendous power, reaching the stratosphere at an elevation of 41,000 feet, 36,000 feet above the ground, in about five minutes, breaking without interruption through a temperature inversion at 17,000 feet which most of the scientists thought would stop it. Two supplementary explosions occurred in the cloud shortly after the main explosion. The cloud contained several thousand tons of dust picked up from the ground and a considerable amount of iron in the gaseous form. Our present thought is that this iron ignited when it mixed with the oxygen in the air to cause these supplementary explosions. Huge concentrations of highly radioactive materials resulted from the fission and were contained in this cloud.

4. A crater from which all vegetation had vanished, with a diameter of 1200 feet and a slight slope toward the center, was formed. In the center was a shallow bowl 130 feet in diameter and 6 feet in depth. The material within the crater was deeply pulverized dirt. The material within the outer circle is greenish and can be distinctly seen from as much as 5 miles away. The steel from the tower was evaporated. 1500 feet away there was a four-inch iron pipe 16 feet high set in concrete and strongly guyed. It disappeared completely.

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Memorandum for Secretary of War

~~TOP SECRET~~

18 July 1945

5. One-half mile from the explosion there was a massive steel test cylinder weighing 220 tons. The base of the cylinder was solidly encased in concrete. Surrounding the cylinder was a strong steel tower 70 feet high, firmly anchored to concrete foundations. This tower is comparable to a steel building bay that would be found in typical 15 or 20 story skyscraper or in warehouse construction. Forty tons of steel were used to fabricate the tower which was 70 feet high, the height of a six story building. The cross bracing was much stronger than that normally used in ordinary steel construction. The absence of the solid walls of a building gave the blast a much less effective surface to push against. The blast tore the tower from its foundations, twisted it, ripped it apart and left it flat on the ground. The effects on the tower indicate that, at that distance, unshielded permanent steel and masonry buildings would have been destroyed. I no longer consider the Pentagon a safe shelter from such a bomb. Enclosed are a sketch showing the tower before the explosion and a telephotograph showing what it looked like afterwards. None of us had expected it to be damaged.

6. The cloud traveled to a great height first in the form of a ball, then mushroomed, then changed into a long trailing chimney-shaped column and finally was sent in several directions by the variable winds at the different elevations. It deposited its dust and radioactive materials over a wide area. It was followed and monitored by medical doctors and scientists with instruments to check its radioactive effects. While here and there the activity on the ground was fairly high, at no place did it reach a concentration which required evacuation of the population. Radio-

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Memorandum for Secretary of War

16 July 1945

active material in small quantities was located as much as 120 miles away. The measurements are being continued in order to have adequate data with which to protect the Government's interests in case of future claims. For a few hours I was none too comfortable about the situation.

7. For distances as much as 200 miles away, observers were stationed to check on blast effects, property damage, radioactivity and reactions of the population. While complete reports have not yet been received, I now know that no persons were injured nor was there any real property damage outside our Government area. As soon as all the voluminous data can be checked and correlated, full technical studies will be possible.

8. Our long range weather predictions had indicated that we could expect weather favorable for our tests beginning on the morning of the 17th and continuing for four days. This was almost a certainty if we were to believe our long range forecasters. The prediction for the morning of the 16th was not so certain but there was about an 80% chance of the conditions being suitable. During the night there were thunder storms with lightning flashes all over the area. The test had been originally set for 0400 hours and all the night through, because of the bad weather, there were urgings from many of the scientists to postpone the test. Such a delay might well have had crippling results due to mechanical difficulties in our complicated test set-up. Fortunately, we disregarded the urgings. We held firm and waited the night through hoping for suitable weather. We had to delay an hour and a half, to 0530, before we could fire. This was 30 minutes before sunrise.

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Memorandum for Secretary of War

18 July 1945

9. Because of bad weather, our two B-29 observation airplanes were unable to take off as scheduled from Kirtland Field at Albuquerque and when they finally did get off, they found it impossible to get over the target because of the heavy clouds and the thunder storms. Certain desired observations could not be made and while the people in the airplanes saw the explosion from a distance, they were not as close as they will be in action. We still have no reason to anticipate the loss of our plane in an actual operation although we cannot guarantee safety.

10. Just before 1100 the news stories from all over the state started to flow into the Albuquerque Associated Press. I then directed the issuance by the Commanding Officer, Alamogordo Air Base of a news release as shown on the inclosure. With the assistance of the Office of Censorship we were able to limit the news stories to the approved release supplemented in the local papers by brief stories from the many eyewitnesses not connected with our project. One of these was a blind woman who saw the light.

11. Brigadier General Thomas F. Farrell was at the control shelter located 10,000 yards south of the point of explosion. His impressions are given below:

"The scene inside the shelter was dramatic beyond words. In and around the shelter were some twenty-odd people concerned with last minute arrangements prior to firing the shot. Included were: Dr. Oppenheimer, the Director who had borne the great scientific burden of

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Memorandum for Secretary of War

18 July 1945.

developing the weapon from the raw materials made in Tennessee and Washington and a dozen of his key assistants — Dr. Kistiakowsky, who developed the highly special explosives; Dr. Baughnidge, who supervised all the detailed arrangements for the test; Dr. Hubbard, the weather expert, and several others. Besides these, there were a handful of soldiers, two or three Army officers and one Naval officer. The shelter was cluttered with a great variety of instruments and radios.

"For some hours two hours preceding the blast, General Groves stayed with the Director, walking with him and steadying his tense excitement. Every time the Director would be about to explode because of some untoward happening, General Groves would take him off and walk with him in the rain, counselling with him and reassuring him that everything would be all right. At twenty minutes before zero hour, General Groves left for his station at the base camp, first because it provided a better observation point and second, because of our rule that he and I must not be together in situations where there is an element of danger, which existed at both points.

"Just after General Groves left, announcements began to be broadcast of the interval remaining before the blast. They were sent by radio to the other groups participating in and observing the test. As the time interval grew smaller and changed from minutes to seconds, the tension increased by leaps and bounds. Everyone in that room knew the awful potentialities of the thing that they thought was about to happen. The scientists felt that their figuring must be right and

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REPRODUCED AT THE NATIONAL ARCHIVES

Memorandum for Secretary of War

18 July 1945

that the bomb had to go off but there was in everyone's mind a strong measure of doubt. The feeling of many could be expressed by "Lord, I believe; help Thou mine unbelief." We were reaching into the unknown and we did not know what might come of it. It can be safely said that most of those present—Christian, Jew and Atheist—were praying and praying harder than they had ever prayed before. If the shot were successful, it was a justification of the several years of intensive effort of tens of thousands of people—statesmen, scientists, engineers, manufacturers, soldiers, and many others in every walk of life.

"In that brief instant in the remote New Mexico desert the tremendous effort of the brains and brawn of all these people came suddenly and startlingly to the fullest fruition. Dr. Oppenheimer, on whom had rested a very heavy burden, grew tenser as the last seconds ticked off. He scarcely breathed. He held on to a post to steady himself. For the last few seconds, he stared directly ahead and then when the announcer shouted "Now!" and there came this tremendous burst of light followed shortly thereafter by the deep growling roar of the explosion, his face relaxed into an expression of tremendous relief. Several of the observers standing back of the shelter to watch the lighting effects were knocked flat by the blast.

"The tension in the room let up and all started congratulating each other. Everyone sensed "This is it!" No matter what might happen now all knew that the impossible scientific job had been done. Atomic fission would no longer be hidden in the cloisters of the theoretical physicists' dreams. It was almost full grown at birth. It was a great

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Memorandum for Secretary of War

18 July 1945.

new force to be used for good or for evil. There was a feeling in that shelter that those concerned with its nativity should dedicate their lives to the mission that it would always be used for good and never for evil.

"Dr. Kistiakowsky, the impulsive Russian, threw his arms around Dr. Oppenheimer and embraced him with shouts of glee. Others were equally enthusiastic. All the pent-up emotions were released in those few minutes and all seemed to sense immediately that the explosion had far exceeded the most optimistic expectations and wildest hopes of the scientists. All seemed to feel that they had been present at the birth of a new age—The Age of Atomic Energy—and felt their profound responsibility to help in guiding into right channels the tremendous forces which had been unlocked for the first time in history.

"As to the present war, there was a feeling that no matter what else might happen, we now had the means to insure its speedy conclusion and save thousands of American lives. As to the future, there had been brought into being something big and something new that would prove to be immeasurably more important than the discovery of electricity or any of the other great discoveries which have so affected our existence.

"The effects could well be called unprecedented, magnificent, beautiful, stupendous and terrifying. No man-made phenomenon of such tremendous power had ever occurred before. The lighting effects beggared description. The whole country was lighted by a searing light

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Memorandum for Secretary of War

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with the intensity many times that of the midday sun. It was golden, purple, violet, gray and blue. It lighted every peak, crevasse and ridge of the nearby mountain range with a clarity and beauty that cannot be described but must be seen to be imagined. It was that beauty the great poets dream about but describe most poorly and inadequately. Thirty seconds after the explosion came first, the air blast pressing hard against the people and things, to be followed almost immediately by the strong, sustained, awesome roar which warned of doomsday and made us feel that we puny things were blasphemous to dare tamper with the forces heretofore reserved to The Almighty. Words are inadequate tools for the job of acquainting those not present with the physical, mental and psychological effects. It had to be witnessed to be realized."

12. My impressions of the nights high points follow:

After about an hours sleep I got up at 0100 and from that time on until about five I was with Dr. Oppenheimer constantly. Naturally he was nervous, although his mind was working at its usual extraordinary efficiency. I devoted my entire attention to shielding him from the excited and generally faulty advice of his assistants who were more than disturbed by their excitement and the uncertain weather conditions. By 0330 we decided that we could probably fire at 0530. By 0400 the rain had stopped but the sky was heavily overcast. Our decision became firmer as time went on. During most of these hours the two of us journeyed from the control house out into the darkness to look

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Memorandum for Secretary of War

16 July 1945.

REPRODUCED AT THE NATIONAL ARCHIVES

at the stars and to assure each other that the one or two visible stars were becoming brighter. At 0510 I left Dr. Oppenheimer and returned to the main observation point which was 17,000 yards from the point of explosion. In accordance with our orders I found all personnel not otherwise occupied massed on a bit of high ground.

At about two minutes of the scheduled firing time all persons lay ~~flap~~ down with their feet pointing towards the explosion. As the remaining time was called from the loud speaker from the 10,000 yard control station there was complete silence. Dr. Conant said he had never imagined seconds could be so long. Most of the individuals in accordance with orders shielded their eyes in one way or another. There was then this burst of light of a brilliance beyond any comparison. We all rolled over and looked through dark glasses at the ball of fire. About forty seconds later came the shock wave followed by the sound, neither of which seemed startling after our complete astonishment at the extraordinary lighting intensity. Dr. Conant reached over and we shook hands in mutual congratulations. Dr. Bush, who was on the other side of me, did likewise. The feeling of the entire assembly was similar to that described by General Farrell, with even the uninitiated feeling profound awe. Drs. Conant and Bush and myself were struck by an even stronger feeling that the faith of those who had been responsible for the initiation and the carrying on of this Herculean project had been justified. I personally thought of Blondin crossing Niagara Falls on his tight rope, only to me this tight rope had lasted for almost

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Memorandum for Secretary of War

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REPRODUCED AT THE NATIONAL ARCHIVES

three years and of my repeated confident-appearing assurances that such a thing was possible and that we would do it.

13. A large group of observers were stationed at a point about 27 miles north of the point of explosion. Attached is a memorandum written shortly after the explosion by Dr. E. O. Lawrence which may be of interest.

14. While General Farrell was waiting about midnight for a commercial airplane to Washington at Albuquerque--120 miles away from the site--he overheard several airport employees discussing their reaction to the blast. One said that he was out on the parking apron; it was quite dark; then the whole southern sky was lighted as though by a bright sun; the light lasted several seconds. Another remarked that if a few exploding bombs could have such an effect, it must be terrible to have them drop on a city.

15. My liaison officer at the Alamogordo Air Base, 60 miles away, made the following report:

"There was a blinding flash of light that lighted the entire northwestern sky. In the center of the flash, there appeared to be a huge billow of smoke. The original flash lasted approximately 10 to 15 seconds. As the first flash died down, there arose in the approximate center of where the original flash had occurred an enormous ball of what appeared to be fire and closely resembled a rising sun that was three-fourths above a mountain. The ball of fire lasted approximately 15 seconds, then died down and the sky resumed an almost normal appearance.

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Memorandum for Secretary of War

18 July 1945.

"Almost immediately, a third, but much smaller, flash and billow of smoke of a whiteish-orange color appeared in the sky, again lighting the sky for approximately 4 seconds. At the time of the original flash, the field was lighted well enough so that a newspaper could easily have been read. The second and third flashes were of much lesser intensity.

"We were in a glass-enclosed control tower some 70 feet above the ground and felt no concussion or air compression. There was no noticeable earth tremor although reports overheard at the Field during the following 24 hours indicated that some believed that they had both heard the explosion and felt some earth tremor."

16. I have not written a separate report for General Marshall as I feel you will want to show this to him. I have informed the necessary people here of our results. Lord Halifax after discussion with Mr. Harrison and myself stated that he was not sending a full report to his government at this time. I informed him that I was sending this to you and that you might wish to show it to the proper British representatives.

17. We are all fully conscious that our real goal is still before us. The battle test is what counts in the war with Japan.

18. May I express my deep personal appreciation for your congratulatory cable to us and for the support and confidence which I have received from you ever since I have had this work under my charge.

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Memorandum for Secretary of War

18 July 1945.

19. I know that Colonel Kyle will guard these papers with his customary extraordinary care.

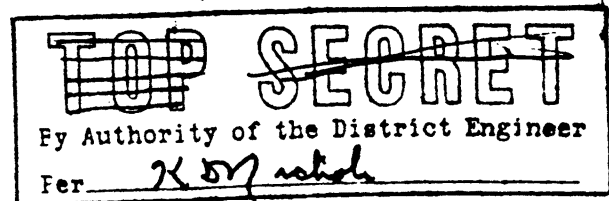
L. R. GROVES,
Major General, USA.

4. Inclosures:
Sketch
Picture
News Release
Statement by E. O. Lawrence

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21 July 1945



TO: Major Gen. Groves

SUBJECT: Report on Test II at Trinity, 16 July 1945

GXX - 4

1. The test was performed two days ahead of the tentative schedule because everything of importance to the test was ready.
2. A study of the weather indicated that a variety of wind directions at slow speeds going in general N.W., and N.E. could be expected with different directions and speeds at different levels for 16 and 17 July 1945. These slow winds would be advantageous in localizing the outfall of active material from the cloud to the site and nearby desert areas. They would also dilute the outfall most effectively in the early hours of the life of the cloud when it would help the most. The monitoring problem would be worse however, because of the wide area covered.
3. In the two days available, the population of the surrounding areas was located by G-2 on large scale maps for a radius of 75 to 100 miles. The deserted areas corresponded fortunately to the most probable courses of the outfall from the cloud as predicted by the directions of the winds at the various altitudes. Troops under Major Palmer were available if monitoring indicated that evacuation was necessary.
4. At zero minus five hours, five cars with Dr. J. Hoffman in charge were stationed with Major Palmer and troops at the outlet road near the east-west highway #380. They were in radio communication with Base Camp and Post #2. Outlying monitor cars were in San Antonio; Roswell, Carrizozo and Fort Sumner to cover these areas in case the speed of the cloud was greater than predicted.
5. Dr. Aebersold was in general charge of the monitoring at Base Camp and the three shelters at 10,000 yards, with local telephone and radio communication. There was a technician monitor and doctor in each shelter and at Base Camp.
6. Dr. Hempelmann in charge of all the monitoring program was at S 10,000, the center of communication and final decisions (also Brig. Gen. Farrell, Dr. Oppenheimer, Dr. Bainbridge, Mr. Hubbard, etc.)
Farrell
7. This officer acted as liaison in a secondary communication center in Base Camp. Lt. Col. Friedell was located with G-2 at Albuquerque as another communication center via long distance for controlling the field monitoring in case Base Camp communications broke down. All groups were keyed in by identical maps showing preliminary locations of the monitors, their presumed course, the two possible paths of the cloud, WNW and NNE (depending upon the altitude which it reached) houses and nearby ranges, etc.
8. Accessory equipment and other preparations were in keeping with the preliminary plans submitted in the preliminary plan. *changed to [unclear] with the preliminary plans submitted in the preliminary plan.*

TR-5.36(c)

Document contains information affecting the national defense of the United States within the meaning of Executive Order 12812, Sec. 1.5, and 32, the transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

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Authority *NND 731039*
BY *2 R* DATE *10-29-73*

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21 July 1945

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9. The shot was fired at 0530 on 16 July 1945.

The energy developed in the test was several times greater than that expected by scientific group. The cloud column mass and top reached a phenomenal height, variously estimated as 50,000 to 70,000 feet. It remained towering over the northeast corner of the site for several hours. This was sufficient time for the majority of the largest particles to fall out. Various levels were seen to move in different directions. In general the lower one-third drifted eastward, the middle portion to the West and northwest, while the upper third moved northeast. Many small sheets of dust moved independently at all levels and large sheets remained practically in situ. By zero plus 2 hours, the main masses were no longer identifiable except for the very high white mass presumably in the stratosphere.

10. By 0800 hours the monitors reported an area of high intensity in a canyon 20 miles northeast of zero. Since this was beyond the tolerance set and equally high intensities were expected in other areas, four more monitor cars were sent into this northeast area from Base Camp. The roving monitors in this area were each accompanied by a trooper in a 4 wheel drive and authorized to evacuate families if necessary. At no house in this whole north and northeast area between 20 miles and 40 miles from zero was a dangerous intensity found. The highest intensities fortunately, were only found in deserted regions. The highest found is shown in detail attached #1. Intensities in the deserted canyon were high enough to cause serious physiological effects.

11. The distribution over the countryside was spotty and subject to local winds and contour. It skipped the nearby highway #380 (20mi. N.E.) except for low intensities which were equaled at twice and three times the distances. It is presumed that the largest outfall occurred in the N.E. quadrant of the site. This can only be explored by horseback at a later date.

12. The monitors all took considerable risks knowingly and many have received exposures of considerable amounts, i.e., 8r total. This is safe within a considerable margin. They should not be exposed to more radiation within the next month.

13. The dust could be measured at low intensities 200 miles north and northeast of the site on the 4th day. (Attached #2) There is still a tremendous quantity of radioactive dust floating in the air.

14. Neither the Base Camp or the shelters were contaminated very much.

15. Partially eviscerated dead wild jack rabbits were found more than 800 yards from zero, presumably killed by the blast. A farm house 3 miles away had doors torn loose and suffered other extensive damage.

16. Details indicating blast, heat and other effects cannot be worked out until the area around the crater "cools down".

It is this officer's opinion, however, that lethal or severe casualties would occur in exposed personnel up to two miles from a variety or combination of causes, i.e., blast, heat, ultraviolet and missiles.

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21 July 1945

REPRODUCED AT THE NATIONAL ARCHIVES

The light intensity was sufficient at nine miles to have caused temporary blindness and this would be longer lasting at shorter distances. Several observers at 20 miles were bothered by a large blind spot for 15 minutes after the shot. The light together with the heat and ultraviolet radiation would probably cause severe damage to the unprotected eyes at 5-6 miles; damage sufficient to put personnel out of action several days if not permanently. All of the personnel obeyed the safety precautions during the test so that no such injury resulted.

17. A great deal of experience was obtained on the requirements for quick and adequate monitoring. Excellent radio communications, good transportation and better and more rugged meters are required.

18. It is this officer's opinion based on the damage to "Jumbo" (2400 ft), the extent of the glazed sand area (up to 500 ft.), the extent of the cleaned off area (about 1 mile), the farm house (at 3 miles) that this explosion was a great many times more violent than the 100 ton test. "Conservative" estimates by the scientific groups put it at least equivalent to 10,000 tons of T.N.T.

19. While no house area investigated received a dangerous amount, ie., no more than an accumulated two weeks dosage of 60r, the dust outfall from the various portions of the cloud was potentially a very dangerous hazard over a band almost 30 miles wide extending almost 90 miles northeast of the site.

20. It is this officer's opinion that this site is too small for a repetition of a similar test of this magnitude except under very special conditions. It is recommended that the site be expanded or a larger one, preferably with a radius of at least 150 miles without population, be obtained if this test is to be repeated.

Stafford L. Warren

Colonel Stafford L. Warren
Chief of Medical Section
Manhattan District

SLW/fp

cc/ Maj. Gen Groves (2)
R. Oppenheimer (1)
Col. Warren (1)



WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON 25, D. C.



November 21, 1944

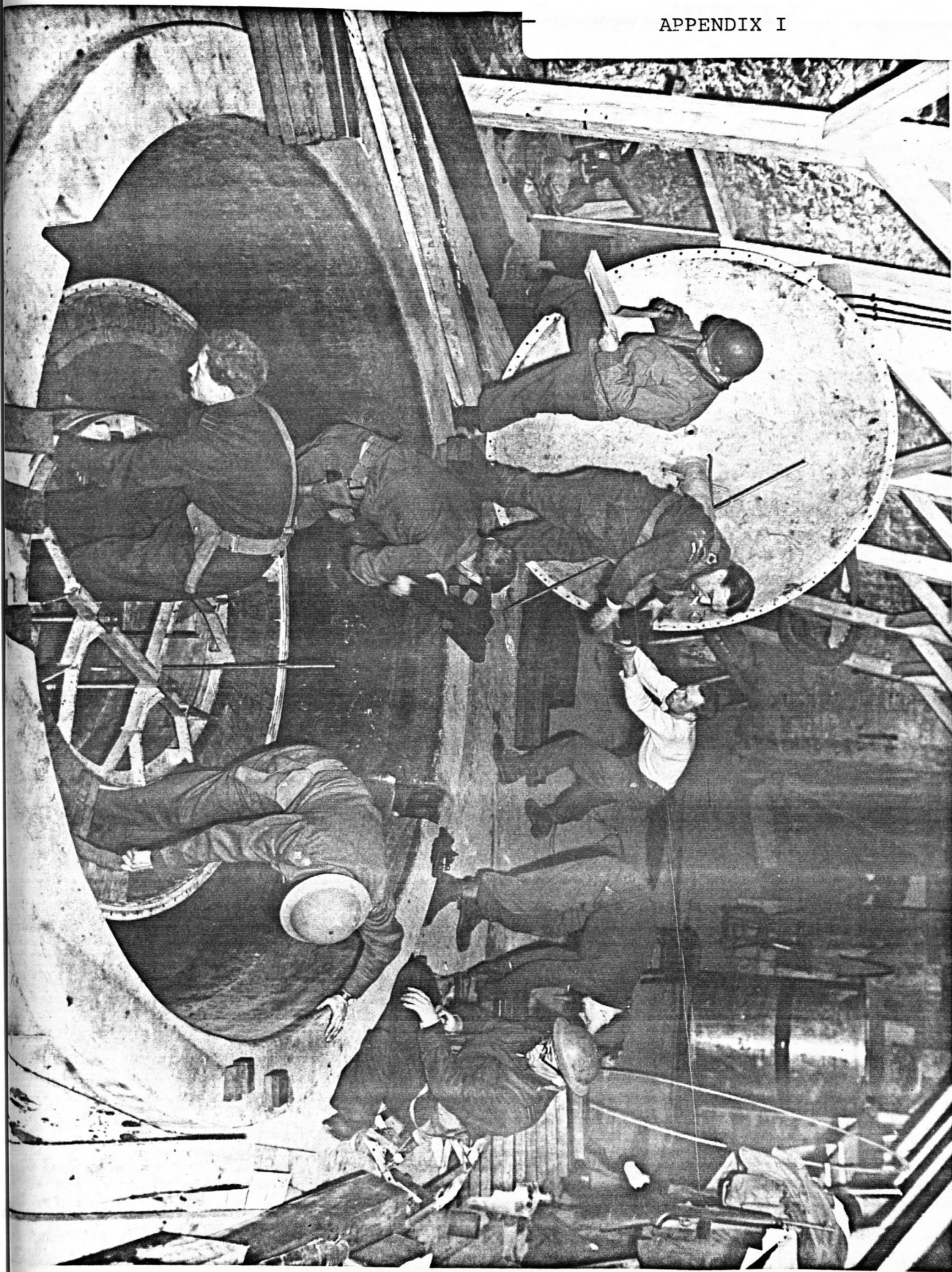
TO WHOM IT MAY CONCERN:

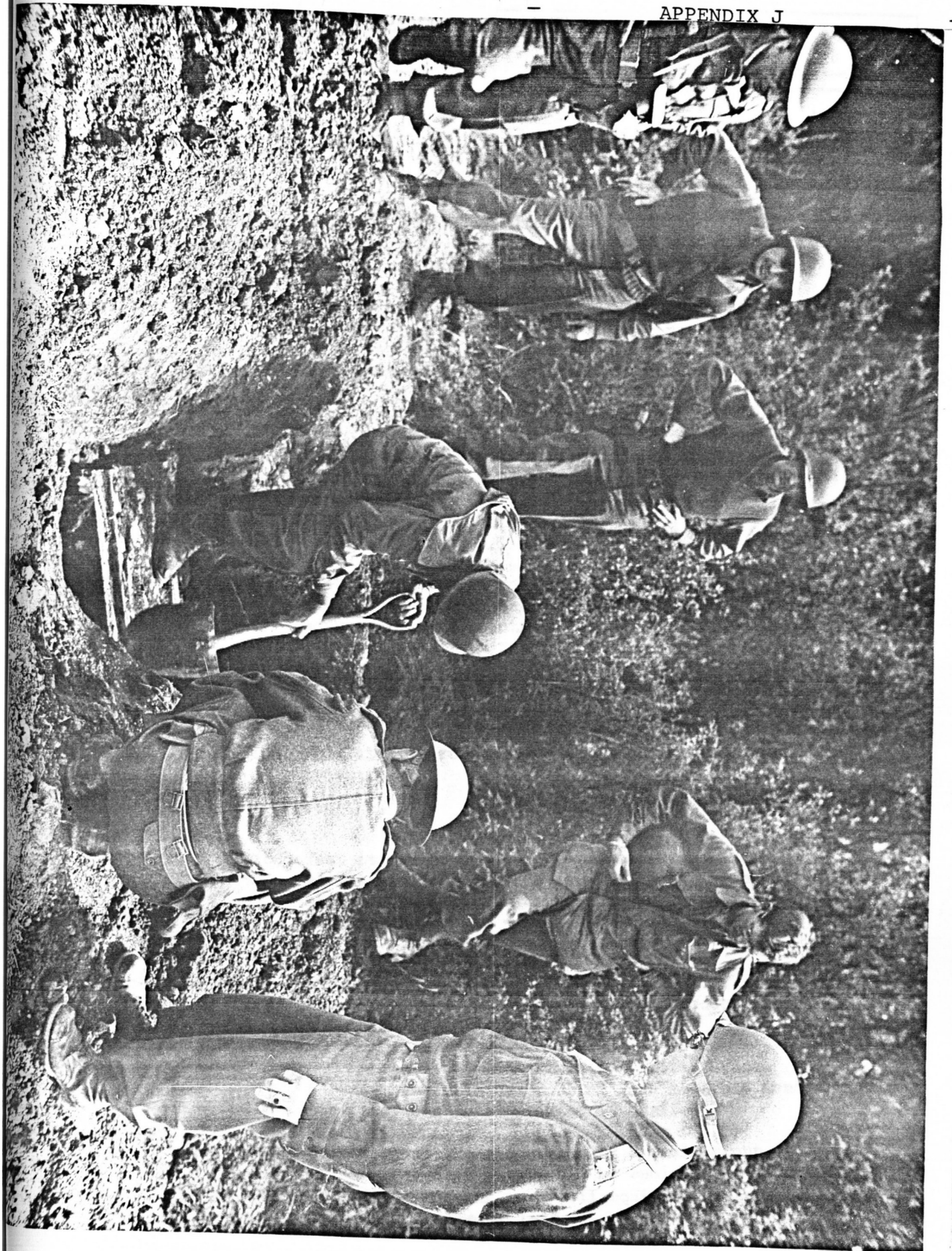
Lieutenant Colonel John Lansdale, of the office of the Chief of Engineers, is proceeding overseas on an important War Department mission.

It is desired that he be furnished any assistance necessary in the accomplishment of his task.

By direction of the Chief of Staff:

FRANK MCCARTHY
Colonel, General Staff Corps
Secretary, General Staff





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General rules governing the information to be contained in the document under preparation by Dr. H. D. Smyth with a view to release for publication not sooner than the first effective use in action.

The information to be included in a release must satisfy one of the detailed requirements in each of the two following groups:

I

- (a) That it is important to a reasonable understanding of what has been done on the project as a whole

or

- (b) That it is of true scientific interest and likely to be truly helpful to scientific workers in this country

and

II

- (a) That it is already known generally by competent scientists

or

- (b) That it can be deduced or guessed by competent scientists from what is already known, combined with the knowledge that the project was in the overall successful

or

- (c) That it has no real bearing on the production of atomic bombs.

Or in a limited number of cases (say 5) and these will be reported in a separate memo so that they can be eliminated if desired

- (d) That it could be discovered by a small group (fifteen, of whom not over five would be senior men) of competent scientists working in a well equipped college laboratory in a year's time or less.

Dist. of rules - 1, 2, 3, 4, 5 - Dr. Smyth's file

